

REPORTS
NATIONAL QUARANTINE SERVICE
SERIES VII — 1937

Edited by
WU LIEN-TEH (伍連德)
Director
and
C. Y. WU (伍長耀)
Senior Quarantine Officer

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SHANGHAI, CHINA
WEISHENGSHU
NATIONAL QUARANTINE SERVICE
R. C. 26 (1937)

NATIONAL QUARANTINE SERVICE

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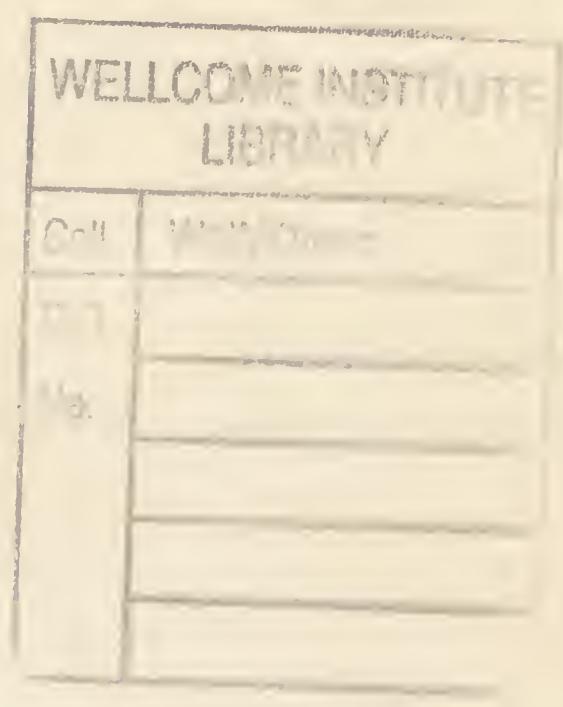
Senior Quarantine Officer



SHANGHAI, CHINA

WEISHENGSHU
NATIONAL QUARANTINE SERVICE

R.C. 26 (1937)



PREFACE

SEVEN VOLUMES of the *Reports* have been published since the establishment of the National Quarantine Service in 1930. Throughout this period the editors have aimed at presenting not only a statistical record of the activities of the various Stations under the control of the Service but, even more emphatically, the progress of scientific investigations conducted by members of the staff.

Whether the editors have succeeded in making facts and figures attractive enough to tempt even hard-boiled shipping men to read the Reports sent them regularly, they are unable to say. It is true, however, that an attempt has been made to cater to the interests of non-medical readers in official, commercial and shipping circles throughout the country. A quarantine organization cannot, by its very nature, be a self-contained unit. It must work with, as well as for, the general public. In this respect the National Quarantine Service has not failed. Whatever doubts might have arisen in the minds of shipping men when the territorial authorities took over quarantine administration in this country from the Maritime Customs were quickly dispelled when it was made clear that modern port health regulations need not necessarily conflict with legitimate shipping interests. Indeed, we may go so far as to say that maritime commerce is safeguarded by the intelligent application of recognized methods of disease prevention.

It is not generally known that when the question of establishing an up-to-date quarantine service in China was brought up by the government in consultation with the League of Nations, the interests of trade in the cosmopolitan port of Shanghai were constantly kept in mind. The cooperation of shipping interests was assured when in 1929 the International Chamber of Shipping expressed itself in favour of the scheme through the experts delegated by the Communications and Transit Organization of the League of Nations. Perhaps the cardinal principle of the government's policy may best be expressed in the following terms:

While keeping in mind the obligations China has assumed in conjunction with other maritime nations concerning the control of communicable diseases disseminated by sea, land and air routes, and while maintaining at the same time strict supervision over possible invasion of the country by ship-borne diseases, the authorities have at all times realized that the prosperity of a port depends a great deal upon the smooth and uninterrupted functioning of legitimate shipping entering and clearing it.

An outstanding example of this solicitude for international trade may be quoted. As long ago as 1932 we realized that on account of the tidal condition of the Whangpoo river it would mean a great saving of valuable time if vessels did not have to wait outside Woosung for medical inspection. We went into every aspect of the question and decided to permit shipping to enter the harbour and undergo inspection at their berths, provided certain conditions relating to health were fulfilled. When this step was taken it was considered a bold stroke of policy and somewhat revolutionary. But the history of the past few years has justified our action. Recently the New York quarantine authorities adopted similar measures in the interests of shipping. Provided certain formalities are fulfilled, large passenger liners on regular schedule are granted radio pratique and permitted to enter New York harbour without anchoring off Staten Island for quarantine inspection. It is expected that other ports will follow the lead so courageously shown by Shanghai and New York. In a sense it is a logical outcome of our more accurate knowledge of the origin and spread of infectious diseases, for after all, we are no longer living in the old days when ships harbouring noxious diseases were sunk with their cargoes and poor passengers sick with the plague were handled by fantastically-garbed men carrying long-pronged forks!

The routine work of the Service was carried out satisfactorily and with dispatch during the past year. Boarding, fumigation, medical and emigration activities proceeded as smoothly as the shortage of staff permitted. The officers in charge of Amoy, Tsin-Tang-Chin, Wuhan, Canton and Swatow Quarantine Stations are to be congratulated on a good year's work performed under serious handicaps; they have been loyally assisted by their respective staffs, both medical and lay. The present (seventh) series of *Reports* contains full records of the past year's doings, in addition to original articles and addresses.

It is pleasing to note that the manual on Plague published in 1936 has had an excellent reception both in this country and abroad. It would appear that the book has found a place on the shelves of both public health workers and specialists. The first edition is almost exhausted and, if sufficient inducement is forthcoming, the authors expect to bring out a second revised edition in the near future.

We have again to thank the Customs, various consuls and officials, shipping firms, ships' officers and the general public for their continued cooperation in the widespread and intricate activities of the National Quarantine Service of the National Health Administration. Finally, every member of the Service has reason to be grateful for the inspiring leadership of His Excellency Dr. J. Heng Liu, Director General of the National Health Administration.

WU LIEN-TEH
C. Y. WU

Shanghai, China,
March 31, R.C. 26 (1937).



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THE NEW MEDICINE AND ITS IMPACT ON OLD-STYLE CHINESE MEDICAL PRACTICE*

BY WU LIEN-TEH

There are few places more suitable than Hongkong to form a background for a discussion of Chinese medical history. For this was among the first cities where the early attempts to educate Chinese pupils in modern medicine were placed upon a solid foundation by the opening of a proper medical school in 1887. And it was in this colony also where the late Dr. Sun Yat-sen, founder and First President of the Chinese Republic, received his diploma. Not less striking is the close proximity of Hongkong to the cradle of modern Chinese medicine in Canton and Macao. Indeed, it may be maintained that the government medical undertakings in Hongkong form a direct continuation of the activities of the surgeons of the East India Company resident at Canton and Macao, and that the present medical missionary undertakings are a continuation of the hospital work commenced at Macao in 1838, and later transferred to Hongkong in 1843.

The celebration of the centenary of the Canton Missionary Hospital in 1935 will have brought to your minds the fact that before the establishment of the Macao Hospital the new medicine had already gained a permanent foothold in South China. Earlier still, at the very beginning of the 19th century (1805), Jenner's method of smallpox vaccination had been introduced into Canton by Alexander Pearson, one of the great surgeons to the East India Company. In 1820 a dispensary for Chinese had been opened at Macao by Dr. Livingstone and the Rev. Robert Morrison, followed in 1828 by the opening of an Ophthalmic Hospital in the same city and a dispensary for the Chinese at Canton, both under the guidance of Dr. Colledge, who like Livingstone was attached to the East India Company. Though these undertakings were maintained for more or less limited periods, they benefited thousands of people and paved the way for the opening of the Canton Hospital under Dr. Peter Parker, the first medical missionary to China.

It may be interesting to recall the opinions of these pioneers and their immediate followers as to the old-style practice of that time.

*Lecture delivered before the Hongkong University Medical Society, Dec. 4, 1936.

In their view, Chinese medical art had become inadequate, being bound by the fetters of tradition. Practically no surgery was performed; indeed the knowledge possessed by the practitioners upon anatomy and physiology consisted mostly of absurd concepts, not backed by actual observation. The treatment of eye diseases was most primitive, in fact so unsuccessful that the early foreign doctors felt an urgent need to specialize in this domain. Diagnosis seemed to be based upon an examination of the pulse alone to the exclusion of other methods, a whole structure of theories being built upon this flimsy foundation. In treatment, fancies and not facts appeared to preponderate, consisting as it did partly of the indiscriminate use of acupuncture and similar manipulations, and partly of drugs which the early foreign observers believed inadequate, sometimes repulsive.

When we consider how the newcomers were hampered first by the lack of knowledge of the Chinese language and customs and then by the demands made upon their time and attention by hosts of sufferers, it is not surprising to find that those early impressions of old-style Chinese practice proved in some cases to be out of perspective, in others quite incorrect. Since that time prolonged and patient studies have been carried out, first by enlightened and erudite foreigners, later by Chinese experts, thus enabling us now to evaluate properly the strong and weak points of indigenous Chinese medicine.

Anatomy.—It must be admitted that the early foreign observers erred least in their unfavourable judgment of anatomy, physiology and consequently surgery. For, although there are some early references to dissection, the traditional belief in the sacredness of the body made attempts in this direction rather sporadic. *The Filial Classic* of Confucius says, “Our body, skin and hair come from our parents; we must not mutilate them.” This prohibition was lifted when the Manchus enforced the wearing of the queue with a shaved area around the head, and also since the advent of the Republic, when all men had their hair cut short. Nowadays, even women do not allow their hair to grow long but visit beauty parlours for singeing and permanent wave and sometimes indulge in the lifting of the skin to beautify the face!

When needed for purposes of dissection the corpses of bandits and criminals were secured. For these reasons, apart from some attempts to give exact measurements of the internal organs, but little useful knowledge is available in the old writings on anatomy.

A laudable attempt to replace idle speculations with careful observations was made by Wang Ching-jen who published in 1850 a booklet called “Correction of Medical Errors.” Here he describes how during an epidemic of measles and dysentery he had an

opportunity to inspect the dead bodies of numerous children carelessly buried, thus permitting of a close examination of the internal organs. Unfortunately he mistook the arteries for air vessels—an error he shared with the European investigators before Harvey. This is the more deplorable as there is little doubt that the ancient Chinese possessed some knowledge of blood circulation. The following significant passages can be found in the "Internal Classic" (*Nei-ching*):

"All the blood is under the control of the heart".

"The heart regulates all the blood of the body".

"The blood current flows continuously in a circle and never stops".

However, the difference between arteries and veins was not mentioned, nor were the systemic and pulmonary circulations understood, and subsequent practitioners for almost 2,000 years did not pursue the matter further.

Surgery.—A similar lack of progress was present in surgery. Though we read of ancient masters, like Pien Ch'iao and Hua T'o, who knew anaesthesia and performed major operations under its influence, their art did not survive them. Legend has it that the manuscripts of Hua T'o were burned with the exception of a few pages dealing with castration. This is adduced as explanation why castration, performed by specialists, remained the only bold operation in old-style practice. The average surgeon was both by training and by equipment unable to carry out anything beyond the most simple interferences, like incision of abscesses and was—as for a long time in Europe—considered of a rather lower caste than the physician.

Eye Diseases.—Though writings dealing with eye diseases were abundant, practical results were not encouraging. Lee T'ao, in a recent contribution (October, 1936) summarizes that, inasmuch as ophthalmic diseases were considered in close relationship to the different organs, emphasis was laid upon internal medication and also on acupuncture rather than upon local treatment. However, powders and ointments, sometimes lotions were applied to a certain extent, the remedies including potent drugs like copper sulphate, borax and alum. Trachoma was recognized long ago and often successfully treated. The five kinds of operations carried out were (a) hooking or "blunt cutting method;" (b) cutting for removal of pterygium; (c) needling for removing cataracts; (d) cauterization for ulcers and pterygia; and (e) clamping for trichiasis by shortening the lids through scar formation. This is done with a forceps made of bamboo. To judge by the Chinese proverb, "No treatment, no blindness," the faith of the Chinese in the skill of their ophthalmologists was not great. Such methods as mentioned above may still be seen in the bazaars of many crowded cities.

Pulse-lore.—It would be bewildering rather than instructive, were I to give in this lecture a survey of the pulse-lore of the ancients. It was claimed that feeling of the pulse alone is sufficient for diagnosing all kinds of diseases and that it can foretell the sex of a child within a pregnant mother. More than that, by feeling of the pulse a man may be judged noble or common, rich or poor, destined for a long life or bound to die soon!

It is clear that, just as a nostrum claiming to cure all diseases will be found useful for none, so the excessive bragging of the pulse specialists indicates the worthlessness of their method. Nevertheless, there is much truth in K. C. Wong's plea to make a distinction between the later-day absurdities of the Chinese pulse lore and the merits which this method might originally have possessed. He considers it as probable that the ancient practitioners, reduced to a few methods of physical examination, might have developed a technique in learning things from the pulse which is lost to the modern physician, who relies upon refined methods of diagnosis by X-rays, electrocardiography and laboratory investigations.

Physical Therapy.—The application of methods of physical therapy developed on lines similar to those of diagnosis. Acupuncture, practised since the earliest times and amply discussed in the "Internal Classic," was probably of distinct benefit so long as it was used in a judicious manner. Indeed, the late Sir James Cantlie tried to introduce it into modern practice, applying it successfully in certain cases of rheumatism. It should also be emphasized that enlightened old-style physicians, like Wang Tao in his work "The Medical Secrets of an Official," objected to the continued use of acupuncture which in his opinion had become a lost art, and recommended moxa in its place. However, no attention was paid to such warnings. The practice continued to be advocated and was at the same time debased through its indiscriminate application to all sorts of diseases and leaving it mainly in the hands of ignorant quacks or barber surgeons.

Acupuncture was only one of various methods of physical therapy in old-style Chinese practice. Besides this, ample use was made of moxa, in which cones of common mugwort (*artemisia moxa*) are applied to the skin at certain spots and ignited. Though this method is rather painful and the resulting wound is apt to become infected, the underlying principle of counter-irritation appears rational.

It is generally acknowledged that massage has been practised in China from time immemorial. Less known is the fact that a few of the ancients, like Hua T'o, made excellent use of hydrotherapy in the treatment of fevers. Unfortunately, this mode of treatment was not continued.

Infectious Diseases.—Turning to infectious diseases, we find that in some respects the ancient ideas were quite sound. *Leprosy* was first mentioned in the Chou dynasty. One of Confucius' disciples, Pai Niu, was supposed to have died of it. The *Nei Ching* of Huang Ti, thus says, "Those suffering from 'ta feng' have stiff joints and the eyebrows as well as beard fall off; the channels being clogged, the flesh becomes nodular and ulcerates." For treatment, early prolonged medication and moderation in all things were emphasized. Chaulmoogra oil was recommended by Chu Tan-chi as early as the 14th century.

Cholera or the syndrome *huo luan*, which even in the early days was described as a sudden disturbance of the bowels and stomach, had a place in the *Nei Ching*, but the actual infection as we know it nowadays is believed by Yu Yun-hsiu, a living scholar, not to have been known in China until the great pandemic of 1817, since which time it has retained a more or less firm hold in this country.

Smallpox is another old disease upon which more books have been written than perhaps any other affection. The general opinion is that it was introduced from outside, perhaps Mongolia, about 49 A.D. as a result of war with the Mongols, one general, Ma Yuan, actually succumbing to the disease. An epoch-making contribution of the Sung dynasty was the discovery of inoculation against smallpox. This happened in 998-1022 A.D. when the prime minister, Wang Tan, invited a learned philosopher of Omei Mountains in Szechuen to treat his sons. It is quite possible that scientific ideas regarding inoculation were exchanged between Chinese, Arabian and Persian savants at that time resulting in its introduction into Constantinople, whence Lady Mary Wortley Montague, wife of the then British Ambassador to Turkey, introduced the method into England in 1717 by first trying it upon her own children, and then upon intimate friends of her aristocratic circle. This valuable means of prevention against a disfiguring, often fatal disease, became prevalent until superseded by the safer method of vaccination with calf-lymph, as introduced by William Jenner, in 1792. When the East India Company commenced to trade with South China, its medical officer, Dr. A. Pearson, ordered the virus from India, where it had been received with favour, so that the year 1805 saw the first vaccination by cowpox vaccine of human beings in China. So rapid and universal was the success achieved, that calf-lymph vaccination became most popular, not only in Kwangtung, but as far north as Shanghai and Peking, and soon replaced the older and cruder means of inoculation with human-pox powder. This period may be termed the first stage in the introduction of scientific medicine into China. At the same time, it would be wise to withhold as far as possible the use of the word "western

medicine" when indicating modern or scientific medicine, for, as has been seen above, the first seeds were sown in the east, not in the west, and if an error was committed by early Cantonese in using the term *hsı* (western) as distinguished from *chung* or *kuo* for Chinese or national, thus bringing with it misunderstanding and prejudice, the former should be discarded, and a simpler and plainer *hsin* meaning *new* or *modern* (新) adopted. The difficulty is more evident in the Chinese rather than the English application. For true science cannot be a monopoly of the east or west, since humanity is universal and benefits all creeds and races.

Plague or *shu-yi*, as contrasted with smallpox and cholera, is not found in any ancient Chinese publication. In a book called *Ping-yuan* or "Sources of Disease" published in 610 A.D., mention was first made of *E-hē* or "malignant bubo," described as "coming on abruptly with high fever together with the appearance of a bundle of nodes beneath the tissues. The size of the nodes ranges from a bean to a plum. The skin and muscles around are dry and painful. The nodes may be felt to move from side to side under the skin. If prompt treatment is not given, the poison will enter the system, cause severe chill and end in death."

The treatise on epidemics or *Wen-yi-lun* published in 1642, introduced the word *ko-ta-wen* which has been copied into German and English books. Until the word *pesuto* (transliteration of *pest*) was introduced after Kitasato's time, the Japanese used the character *yi* or *yeki* (疫 meaning epidemic) for plague.

From a book of 31 pages by Hung Liang-chi (1736-1809) entitled "Poems by Pei Chiang" the term *Yang-tzu Ping* or glandular infection was found. Shih Tao-nan (1765-1792) a young man of extraordinary talent who died of the plague, composed a poem in which one part "Death of Rats" vividly described the plague epidemic occurring in a city in Yunnan in 1792. Because of Hongkong's close connection with this disease, I beg permission to quote four of the striking verses:

Dead rats in the east,
Dead rats in the west!
As if they were tigers,
Indeed are the people scared.

Few days following the death of the rats,
Men pass away like falling walls!
Deaths in the day are numberless,
The hazy sun is covered by sombre clouds.

While three men are walking together
Two drop dead within ten steps!
People die in the night,
Nobody dares weep over the dead!

The land is filled with human bones,
There in the fields are crops,
To be reaped by none;
And the officials collect no tax!

You will notice his reference to the connection between rodents and the disease.

Syphilis is another important disease widely prevalent during the latter part of the Ming dynasty (1368-1644). No doubt, it was introduced by Portuguese sailors visiting China, who had themselves received infection from Spaniards returning with Columbus after the discovery of America. Li Shih-chen, author of the *Pen Ts'ao Kang Mu*, said that syphilis was unknown in China until 1488-1521, when patients were given pills of mercury for treatment. It started in Kwangtung, spread to the north and then other parts of the empire.

Materia Medica.—The systematic use of drugs for the treatment of diseases has a history as old as that of the Chinese race. The oldest Herbal, the *Pen-Ts'ao Ching*, is ascribed to Emperor Shen Nung (2838-2698 B.C.), though it actually appeared during the Western Han dynasty (206 B.C.-25 A.D.). Since that time numerous works on *materia medica* have been published culminating in the Great Herbal (*Pen-Ts'ao Kang-Mu*) by Li Shih-chen in 1595 A.D. This great classic consists of 52 volumes, the material being arranged in 62 orders under 16 classes—water, fire, earth, metals and minerals, herbs, grains, vegetables, fruits, trees, garments and utensils, insects, fishes, molluscs, birds, beasts and men. Of the 1,871 drugs enumerated 1,074 are derived from plants, 443 from animals and 354 from minerals and other substances. Besides numerous drugs common to both Chinese and European medicine, the former contained such valuable materials as kaolin, eumenol, chaulmoogra oil and ephedrine, which last is now included in most official pharmacopoeias.

In a paper read at the Congress of the Far Eastern Association of Tropical Medicine, Nanking, October 1934, on "The Newer Pharmacology and its Relation to Ancient Medicine," Prof. B. E. Read emphasised the changes that had taken place in recent years regarding the armamentarium of the modern physician, who now looks to glandular products for the treatment of deficiency diseases and to a study of the patient's diet, not so much to limit it as to provide what is lacking in its constituents. In the place of the nine substances of animal origin appearing in the 1909 pharmacopoeia, there are now nearly one hundred, including liver extract, stomach, insulin from the pancreas, fibrinogen from the lung, vitamin A from the eye, adrenalin, thyroxin, parathormone, etc. The new conception of treatment fairly corresponds with ancient Chinese ideas, by which at least 26 parts from six different animals are used for medicine.

From the pig alone, 34 parts are listed as of medicinal value. Thus, pig's liver (rich in vitamins A, B, C, D and E) was recommended in the *Pents'ao* for night blindness, beri-beri, scurvy, emaciation and oedema; pig's pancreas is the source of three digestive principles; sheep's eyes are used for dimness of vision and conjunctivitis; dog's brain obtained from the same animal that bites a person is applied to the wound, thus suggesting a connection with the modern Pasteur treatment of injecting an emulsion of the brain and spinal cord of rabbits infected with rabies into the victim.

With regard to deficiency diseases, it has been found that for night-blindness (due to lack of vitamin A) the addition of 5 percent of dried yellow day lily (黃花菜) to the diet quickly cures the complaint in rats. The Chinese pharmacopoeia recommends other remedies, such as, mung beans, shepherd's purse (薺), walnut, pig's liver and others for this trouble. For beri-beri or *chiao-chi* (脚氣) 89 drugs are said to be of value, and Ch'en Ts'ang-ch'i (陳藏器) as far back as the T'ang dynasty warned against the constant use of polished rice, which he said would lead to weakness of muscles, drowsiness and general lassitude. Considering that modern medicine has traced beri-beri to lack of vitamin B in polished rice, this statement by an ancient Chinese physician is almost prophetic. Vitamin E, the lack of which is supposed by modern workers to cause sterility, may, if the opinions of ancient Chinese pharmacologists do not go astray, be supplied by human placenta, rat's feces, dog's meat, deer-horns, etc. A considerable amount of research has also been done by W. Y. Lee and R. G. Cheng in a basic analysis of common Chinese foods and drugs, varying from spinach, mustard leaves, bamboo sprout to taro, pumpkin, eggplant, cowpea, soybean and cabbage. Prof. S. Kubota of Mukden draws attention to the isolation of an active principle, called sinomenin, from the well-known Chinese drug *han-fang-chi* (漢防已) which is most useful for rheumatism; also *hai-jen-tsao* (海人草) for the treatment of round worms. From the woody part of the camphor tree two preparations, novonal and mibunol, have been extracted for the treatment of gonorrhoea. For coughs, glucosids from the root *yuan-chih* (遠志) and the seed *ch'e-ch'ien* (車前) have been obtained, while the alkaloid ephedrine derived from *ma-huang* (麻黃) is too well-known to need reiteration. Lastly, a valuable heart tonic, *vitacamphor*, has recently been recovered from the urine of dogs fed with camphor, which seems to decompose within the body of the animal and produce a strong and yet safe cardiac stimulant giving quick and accurate effects when needed. Compare this with the isolation of *theelin* from the urine of parturient women by an American firm of biological chemists for female disorders.

Hygiene.—A study of ancient Chinese medical literature also shows that the prevention of disease was placed above cure, as may be judged by the following quotations:—

“The sage does not treat those who are ill but those who are well.”

“The good doctor pays constant attention to keeping the people well so that there will be no sickness.”

“The good physician first cures the disease of the nation, then individual ailments.”

Chinese medicine attained a high degree of development during the Chou dynasty, particularly in the matter of medical organisation, hygiene and public health. The *Chou Rituals* distinguished four kinds of doctors, namely physicians, surgeons, dietitians and veterinarians. The writings of Confucius, Huai Nan-tzu, Chuang Tzu, Chou Kung and others contain numerous happy references to the performance of healthy living. Thus:

Diseases enter by the mouth.

Take deep breathing to live long.

Do not fatigue your body, not exhaust it, and you will live long.

Contentment and peace shut out all worries, giving no chance for evil to sneak into the system.

Do not marry first relatives, etc.

Among other recommendations was the establishment of hospitals for the deaf, blind, dumb, lame, deformed and insane.

Ideas of a progressive nature may be detected in old Chinese medical literature, and not a few of the old-style therapeutic agents have found a permanent place in the pharmacopoeia of the modern physician. Many factors contributed, however, to reduce or even nullify the benefits of innovations, because these were often kept secret by the discoverers and their immediate pupils. On the whole, old-style Chinese medicine became more and more stagnant as time went on. In China, as in mediaeval Europe, over-reverence for ancient beliefs and traditions became a stumbling block to progress. The ingenuity of most *savants* was wasted in compiling subtle commentaries upon the old writings instead of being directed toward fundamental research, and the introduction of radical changes was deemed nothing short of heresy. In Europe the medical profession gradually managed to free itself from these superstitions and to give to medicine the dignity of a progressive science taught side by side with other branches of learning at the universities and practised by men of high standing. In China, on the contrary, the profession could not extricate itself from such legendary quagmire. The status of practitioners reached a deplorably low level. Though a few of the ancients were venerated as gods, the average medical man was looked upon as a kind of artisan to be called and dismissed at will. Often he could

see, and prescribe for, a patient but once, so that he had no chance to watch the evolution of diseases or to obtain a thorough insight into the action of therapeutics. His prescriptions were criticised and changed at will by the family and friends of the patient, who did not hesitate to employ quacks and fortune tellers side by side with the regular practitioners. The higher the status of the patient, the greater the number of questionable advisers and therefore the fewer chances to recover.

No wonder that the medical profession ceased for centuries to attract men of good education and character. Consequently the profession was recruited from a class either unfit for manual labour, literary positions or official appointments.

Though praiseworthy attempts at proper education, holding of state examinations and registration of practitioners are on record, efforts in this direction were spasmodic in nature and ceased altogether as time went on. Would-be practitioners were obliged either to acquire elementary training in a haphazard manner or to serve an apprenticeship. It is clear that this system, even if imparting useful knowledge, was unable to provide a proper background for the pupils, who lacked adequate preparation. Apprenticeship was bound to produce more promising results in cases where sons were trained by their fathers. Proverbs like "Do not take medicine by a doctor who is not backed by the experience of three generations" explain the greater prestige of men, who besides their own skill could claim descent from noted medical families.

Beyond such family connections and the benefit to be derived from the study of a limited literature, there was little to encourage the practitioner in his professional life. Though some leaders had set high standards of conduct by their example and the laying down of ethical rules, these were never generally accepted. Medical societies, where the doctors could get guidance and where they could discuss their problems, were totally lacking. Thus each individual was largely left to his own devices.

Looking back upon this evolution we can easily understand why so many of the early foreign doctors coming to China decided that the old system of medicine was devoid of any value whatsoever. It is not surprising, therefore, that attempts by some newcomers to work hand in hand with the old-style practitioners did not lead to satisfactory results. At the Tung-Wah Hospital, Hongkong, both systems have been maintained for scores of years; the annual medical reports of the Director of Medical and Sanitary Services provide interesting reading in this connection.

The pioneers mentioned earlier in this lecture were but the harbingers of an ever-increasing group of foreign physicians who not only continued the work in and near Canton but extended it along the coast to Swatow, Amoy, Foochow, Ningpo, Hangchow, into Shanghai, Nanking, Soochow, then Peiping, Tientsin and finally into the larger cities of Manchuria. Their work was at first largely individualistic, but gradually united efforts became possible. Some of the important milestones along this road were the establishment of a medical school in 1866 connected with the Canton Missionary Hospital under Dr. John Kerr, who published a series of textbooks in Chinese for his students, the creation of a Customs Medical Service leading to publication of a stimulating series of reports, and the foundation in 1886 of the Medical Missionary Association resulting in the issuing of a journal, invaluable equally through the articles it contained and through the opportunities afforded for the discussion of ways and means.

Whilst these labours were instrumental in bringing proper relief to thousands of sufferers, it may be stated that for a long time the new medicine developed rather side by side with the continuance of old-style practice than in open competition with it. One might almost say that their fields had become divided up. Whilst the modern medical men were usually consulted when surgical interference seemed necessary, the majority of Chinese still preferred the old-fashioned therapy for so-called internal complaints. The first serious clash of the two schools arose out of the terrible Manchurian pneumonic plague epidemic, which swept over Manchuria and North China in 1910-11, killing 60,000 persons and costing the government and people about \$20,000,000. Whilst old-style medicine showed itself utterly powerless in this catastrophe, and at least 40 of its protagonists died from the infection, the efficiency and heroism displayed by modern-trained Chinese physicians were instrumental in ridding the country of the plague within the short space of three months. Their work attracted universal attention and laid the foundation of systematic public health activities, thus ushering in a new (second) phase in Chinese medical history. Then followed an interval of consolidation, which the Revolution and the establishment of the Republic delayed but did not stop. The inauguration of the National Government in Nanking and the establishment of the Ministry of Health in 1928 (later changed to National Health Administration) finally co-ordinated all health activities under one central organ. Under the able guidance of Dr. J. Heng Liu, a graduate of Harvard, a series of fine institutions have during the past six years been constructed and equipped in one medical centre in the capital (measuring 400 mou or 65 acres) for the treatment and nursing of patients, the

investigation of disease, the analysis of drugs, and the teaching of health and auxiliary personnel. These and affiliated institutions include the Central Hospital of Nanking, the Central Field Health Station, the Nursing School, the Central Serum and Vaccine Laboratory, the Bio-chemical department, two midwifery schools—one in Nanking and the other in Peiping—a Child Health Station, School Health Services, Rural Health Centres, the National Quarantine Service, Central Epidemic Prevention Bureau in Nanking with a branch in Peiping and also stations in Fukien and the North-west. In order to coordinate activities between the Ministry of Education and the Central Health Administration, a joint Commission has been founded with a trained medical secretary in charge and having sections on medical education, midwifery and nursing.

If we contemplate the amount of work and success crowded into the comparatively short space of a century, the new medicine may indeed be proud of its record in China. But whilst these achievements encourage us to approach the work before us in a spirit of hopefulness, they should not mislead us into minimizing the difficulties and rockers ahead.

In this connection let us deal first with the present status of old-style medicine. The vast numbers still practising these methods have become thoroughly alarmed through the advance of the new medicine, which now really threatens their continued existence. More than that, they have realized that their only hope of salvation lies in uniting their forces. They have been organized into a group powerful enough to secure the support of influential high officials and to prevent efforts to abolish their practice. There is no doubt that many difficulties will be met with until ways and means can be found to settle this involved problem. It is the duty of all modern practitioners to be constantly on the alert and to give their whole-hearted support to their leaders and organizations. Nor should they altogether ignore the herbalists as far as their individual work is concerned. Some pertinent remarks on this point were made by Dr. Knud Faber in his 1931 Report on Medical Schools in China; he thus observed:

When an ever increasing number of Chinese physicians is educated and graduated on modern lines, it will be more and more understood by the population that there can be different kinds of doctors but only one science and art of medicine. I have the idea that this evolution would be hastened if the students in the medical colleges and special schools had to attend a course of medical history including the history of philosophy and the content of the old Chinese medicine—not for using the old methods but for better understanding what they will have to compete with in their future practice. The best manner to combat the superstitions of the old Chinese medicine is to let them come out in the daylight. The modern Chinese doctor must know them as then only will he be able to overcome them and to educate the population in this respect.

Another point I would like to mention in passing is the tendency to rely on proprietary brands of medicine rather than on Galenic prescriptions. It is true that the glaring publicity given to all sorts of patent medicine is influencing laymen in favour of the former, but it seems to me that not a few qualified practitioners also appear too willing to follow these tendencies. Rather should we insist upon the use of scientific preparations adapted to the individual needs of each patient, instead of doling out ready-made stuff indiscriminately. Likewise, we should not neglect the basic methods of physical examination in spite of easy access to supplementary facilities. The danger of debasing our medical art into a craft should not be forgotten.

The vital problem facing medical administrators and educators is, however, not how to deal with individual sufferers but how to extend the influence of modern medicine in its preventive as well as curative aspects, so as to render real service to the masses. If we review this matter by comparing the number of modern-trained practitioners in China with the standards of other countries, we find the former grossly inadequate. For instance, while Great Britain has one doctor for every 800 and the U.S.A. one for 1,000 inhabitants, we find in China, even admitting the maximal figure of 15,000 qualified practitioners, a proportion of 1:30,000.

This situation becomes more serious when the regional distribution of the doctors is considered. An attempt in this direction was made by Drs. Chu and Lai, who in 1935 collected data on 5,390 modern-trained physicians in China, of whom all but 13 per cent were Chinese. It was found that these were congregated in a few large cities, 22 per cent being in Shanghai alone. Nanking and Canton are also crowded with doctors. In the former one-third of the population receives no proper attention, whilst in the latter the saturation point appears to have been reached regarding the number of physicians.

Dr. C. C. Ch'en of Ting-hsien, who investigated conditions from the viewpoint of demand rather than supply, points out that China is an agricultural country, about 85 per cent of her population living in villages and small towns. On account of over-population, the average holding of a farmer's family is five *mou* (or 5/6 of an acre), producing \$40 annually. It is clear that under these circumstances only a minimal sum can be spared for medical relief and indeed it has been found that the farmer spends on an average thirty cents annually for this purpose.

If now \$600 per annum be computed as the minimum salary for a qualified physician, 5,000 people would have to contribute 12 cents *per capita* to keep him alive and an addition of at least \$400-500 per year would be necessary to equip him for active work. This would

mean that 10,000 people are necessary to support a physician—a number which no practitioner could possibly care for.

It is obvious, therefore, that a mere increase in the output of graduates would not really remedy the present situation unless it is accompanied by measures which would direct this increased supply into the proper channels. In other words, since the vast majority of the people are unable to support an adequate number of modern-trained physicians, the introduction of a system of State Medicine becomes inevitable. I am glad to note that this idea is not only shared by medical educators but has been definitely adopted by the National Health Administration. Steps have already been taken to adapt the curriculum of medical schools to this new policy, and it is hoped that the teaching of State Medicine will henceforth form a prominent feature of the educational program. The strategic position of Hongkong University calls for urgent consideration of the establishment of a Chair of State Medicine and of post-graduate courses in Public Health.

It is quite possible that some persons may be against enlarging the powers of the State at the cost of private enterprise. They may fear that the new officials, bereft of the incentive of competition, may be tempted to do a minimum of work. It is beyond my task to deal with the general merits of this view. I feel sure, however, that it does not hold good as far as the medical profession is concerned. We medical men fortunately belong to a calling which demands the highest ethical standards and a spirit of sacrifice. We have seen that many practitioners have in times of need nobly responded to this spirit inculcated by their schools. Quite a number of promising men and women avoid private practice and prefer to receive modest salaries in working for the public weal.

The conscientious doctor in the China of the future would have to know more of preventive than of curative medicine, possessing at his finger tips accurate knowledge of the causes of such infections as smallpox, plague, cholera, diphtheria, typhoid, typhus, trachoma, tuberculosis and willing to send such patients to municipal or government hospitals for treatment rather than attempt it at his own confined or perhaps insufficiently-equipped office. He will practise partly in rural areas and probably receive an allowance from the government for keeping his district inhabitants as free from sickness as possible; in any case he will be in touch with the nearest government health clinics where more facilities for treatment in the form of space, equipment, nurses and medicines are at hand. Through these health stations he will also take a share in advising pregnant women from the early days of conception to childbirth,

which had best take place in a maternity home or the maternity department of a hospital. As the child grows up he will watch its progress step by step up to school-age, when trained school medical officers will supervise the welfare of the pupils through the toils of scarlet fever, diphtheria, measles and such like. Under constant vigilance and examination, a new generation of children will develop with proper physique under a sunny clean atmosphere, immune from infectious diseases, strong against the inroads of tuberculosis, with eyes clear of trachoma and knowing simple methods of not only protecting themselves but also preventing others from being attacked. As the years go by, such a trained generation will marry healthily, possess as many or as few children as it pleases, but all being brought up with a knowledge of the ordinary principles of health. From this the next step to living to a ripe old age is logical, which end can best be achieved without the purchase of old-fashioned and expensive medicaments like ginseng, deerhorns, fungi, etc.

Events in other directions than medicine are shaping themselves very rapidly throughout China, and it is not too much to hope that through a proper appreciation and practice of the new medicine by both the medical and lay public a healthier and stronger generation of Chinese will blossom forth to undertake their duties for their country with greater freshness and energy, thus helping this present quarrelsome world to move along the paths of peace and happiness.

HAINAN, PARADISE OF CHINA*

BY WU LIEN-TEH

Most globe-trotters have heard of two paradises, Hawaii and Bali. The former has sometimes been termed the paradise of the Pacific because of its equitable climate and tropical products, its interesting inhabitants and perhaps its alluring *hula* dances. The island of Bali, on the other hand, situated directly east of Java, has through the efficient publicity given it by the Netherlands government and Dutch steamship companies, prominently come forward during the past twenty years as a tourist centre largely because of its colourful native life supposedly untouched by the march of modern civilization. According to a witty American visitor, its chief claim to attention lies in the fact that it is "the Garden of Eden unadorned."

There is however a third paradise, still comparatively unknown and awaiting to be introduced like Cinderella to interested parties like bankers, industrialists, shipping magnates and publicity agents. This is the large island of Hainan, situated to the south of China, midway on the ocean route between Singapore and Shanghai.

The recent visit (December 2 to 4) of high Chinese government officials led by Mr. T. V. Soong (宋子文), Chairman of the National Economic Council and of the Board of Directors, Bank of China, and including General Yu Han-mou (余漢謀), Pacification Commissioner of Kwangtung province, Civil Governor Huang Mu-sung (黃慕松) of Kwangtung, Financial Commissioner Mr. T. L. Soong (宋子良) of Kwangtung, Mayor Tseng Yang-fu (曾養甫) of Canton, Governor Huang Chiang (黃強) of Hainan Island and Dr. Li Shufan (李樹芬), Medical Adviser, has focussed the world's attention upon this hitherto neglected territory of China.

At a reception given in his honour by the Hainan residents of Hongkong, Mr. T. V. Soong corrected the general belief that Hainan Island could not be developed in view of its remoteness and the rampancy of tropical diseases. On the other hand, Mr. Soong pointed out that unsuccessful efforts at development made in the past had been largely due to the lack of adequate communication facilities, which it was the purpose of the present government to provide, thus enhancing the importance of Hainan as "the larder of China." The

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use of a high-powered Douglas airplane by the government party enabled the members to make an accurate survey of conditions within a short time, and thus hasten the program of reconstruction.

It is the purpose of this article to give as full a description as possible of this interesting island with its promise of development into an important exporting and importing centre, a strategic base, and incidentally a port of call for tourists and students of the few surviving indigenous races of mankind.

GENERAL DESCRIPTION

Hainan Island is the most southerly part of China being separated from the Luichow Peninsula of Kwangtung province by the shallow Straits of Hainan about 15 miles broad. It lies from $20^{\circ} 8'$ to $17^{\circ} 52'$ north latitude and from $108^{\circ} 32'$ to $111^{\circ} 15'$ east longitude.

Its length from east to west is 160 miles, and average width 90 miles with a total area of 14,300 sq. miles. This is practically the same area as that of Formosa which contains 13,890 sq. miles. The latitude of Hainan is almost the same as Cuba and Hawaii, all possessing the same tropical climate. For this reason, ancient writers of India referred to Hainan as the "Isle of Palms," and especially in the southern and eastern parts it well deserves the name, because of the luxuriant growth of coconut, betelnut and other palms.

The principal port, Hoihow (海口), is situated in the north of the island, it possesses a very poor harbour, steamers and even big junks having to anchor in the open sea four to five miles from the shore beyond the shifting sand-bar (called "The Spit") which lies across the entrance to the mudflats. The tides in the Hainan Straits are very peculiar in their ebb and flow, and often a puzzle to navigators. That part of the Hainan Straits leading to Hongkong is in fact so dangerous that few if any vessels dare navigate it at night.

Previous to the advent of steam vessels, big Chinese junks used to sail to distant parts, especially Siam, Burmah, Philippines, Malay States, Ceylon and particularly the Dutch East Indies. In fact, the Bali civilization has been derived partly through the influence of settlers from Hainan, and to this day millions of ancient Chinese cash coins with square holes in the centre for stringing are used as legal tender by the natives with the approval of the Dutch authorities.

Harbours.—As matters are at present, the only available port of call for steamers and large vessels is Hoihow which, as has already been seen, is most inconvenient, and at times positively dangerous for the discharging of passengers and cargo. It has shipping con-

nections with Canton, Hongkong, Haiphong, Pakhoi and Kwangchow-wan.

Along its 500 odd miles of sea-coast may be found at least three deep harbours which would be more serviceable for modern requirements than Hoihow.

Of these, the best natural anchorage is Yu-lin Kang (榆林港) situated at the extreme south of the island, but unfortunately it is at present out of the course of traffic.

On the east are two available harbours, Puchien Bay (舖前港) and Ching-lan Bay (清瀾港); the latter feeds the prosperous district of Wenchang which is the birthplace of the ancestors of Madame Chiang Kai-shek and Mr. T. V. Soong. Toward the north are Hsin Ying (新盈港 Shappu) Bay with a depth of 35 feet which serves the rich district of Nodoa (那大), and Maliu, (馬鳥) Bay just 30 miles west of Hoihow. Present trends point to the possibility of this last location being chosen as an alternative or accessory to Hoihow, since it is only 30 miles to the west, and can be easily reached by a short railway. Other harbours may be enumerated:

San-ya (三亞) on the south, possessing plenty of salt vats
Teng-chiao (藤橋) on the east serving the district of Li-tung
Hsin-chun (新村) on the south, rather shallow
Po-ao (博鳌) on the east, has extensive sand banks.

In 1928 Mr. Olivecrona, a well-known consulting engineer after a careful survey of the island recommended improved facilities at Hoihow by the construction of a sheltered harbour accessible to cargo boats and lighters at all stages of the tide and by shortening the distance between the vessel anchorage and place of landing. This scheme would cost under two million dollars and the time taken would be two years.

HISTORY

Hainan was not mentioned in the Ch'un Ch'iu (春秋) or Spring and Autumn Annals of Confucius. But it was known that under Emperor Chin Shih (builder of the Great Wall) the country south of the mountains of Yueh (粵) and Ts'u (楚) (that is, modern Fukien, Kiangsi and Hunan) was subdued about 220 B.C. In an engagement with the aborigines close to the present city of Canton, Gen. Jen-Ngao (任囂), the commander-in-chief, was slain. The new territory (Kwangtung, Kwangsi and Annam) was incorporated under a viceroy into Han-Hai (Province of the Southern Seas). Jen-Ngao was succeeded by Chao T'ao (趙佗), who declared himself sovereign prince of Nan-yueh in 206 B.C., extended his sway over the regions lying west and south and created an independent state.

However, at the time of Emperor Wu-ti (111 B.C.), Han dynasty, Gen. Lu Po-teh (路博德) conquered Nan-yueh and absorbed it into the empire. He also dispatched troops across the Straits to Hai-chou (海州—present Hainan) and after subduing the aborigines introduced Chinese colonists numbering 23,000, who consisted mostly of natives from Kwangsi, Coastal Kwangtung and Fukien, including the hardy hakkas.

Before Hainan was subjugated by General Lu Po-teh (路博德), the island had been in the possession of savage aborigines calling themselves Li (俚), this character signifying "base," "low," "plain".

In 43 A.D. General Ma-yuan (馬援) of the Eastern Hans sent a successful expedition to Annam and also placed Hainan Island under the jurisdiction of Ho-p'u (合浦). The inhabitants here willingly tendered their allegiance. Gradually Chinese settlements formed a fringe around the coast, thus keeping a close connection with the fatherland. The character Chiung (瓊) in Chiung-shan (瓊山) and Chiung-chow (瓊州) was adopted in the 7th century, and was derived from a hill with beautiful overhanging rock, twenty miles south of the city.

In 1278 A.D., the Mongol dynasty incorporated the island with the western portion of Kwangtung, and first adopted the name of Hainan, now universally known among foreigners and others. Repeated attempts at rebellion were made by the aborigines during the T'ang and subsequent dynasties. They rigidly excluded all attempts to penetrate the interior. Gradually, however, with the influx of Chinese from the mainland and their admixture with the natives, an intermediate race grew up acknowledging Chinese supremacy and adopting Chinese customs. Hence these mixed tribes became known as Shu-li (熟黎) as contrasted with Sheng-li (生黎) of the interior.

When the Mings came into power in 1368, Chiung-chow Fu was included in the province of Kwangsi, but two years later, it came under Kwangtung again. In 1411, Japanese temporarily landed in Hainan, and captured the outworks of Ch'ang-hwa (昌化) city on the west coast. In 1905 the Manchu dynasty called it Chiung-ai (瓊崖) but in 1921 the name Hainan was definitely settled, and the island placed directly under the Kwangtung government.

The southern and larger half of the island was named Tan-erh (儋耳 Drooping Ear), so termed because its king was supposed to possess ears reaching down to his shoulders. The northern half of the island was called Chu-ai (珠崖 Pearl Shore) because of its rich pearl beds, but these became exhausted in the 15th century. In

ancient times, north Hainan was a well-known source for the supply of pearls, tortoise shells and scented wood for the imperial court.

Hainan was for many centuries a place of deportation for masses of Chinese and the banishment of officials. This succession of banished scholars led to a spread of culture among the colonies and indigenous tribes. In this connection mention should be made of the great poet, Su Tung-po (蘇東坡 Su She 蘇軾) who together with a large retinue was banished to this distant outpost by Emperor Cheh Tsung 哲宗 A.D. 1097. At the close of the 14th century Huang Tao-p'o (wise lady Huang), a native of Hainan, proceeded to central China and taught the art of cotton spinning and weaving. A temple at Chiung-chow is dedicated to her memory. Two famous literati of the Ming dynasty were born in Hainan, namely Ch'iu Tsun (丘濬) and Hai Jui (海瑞). The last was a great statesman, once governor of Nanking, and also instrumental later in suppressing three uprisings of the aborigines in 1501, 1541 and 1550 which necessitated great expense and the dispatch of numerous troops. So far back as the 16th century, this enlightened official proposed the building of wide roads and military posts throughout the island both to facilitate communications and commerce. In addition to attacks from hostile tribes, colonists were exposed to repeated incursions of pirates during the 15th to 19th centuries.

Navigation on the open sea between east Hainan and Canton River was forbidden so as to deprive the pirates of their livelihood, and therefore the traffic between Chiung-chow and the mainland was for a time confined to a narrow track across the straits. However, the pirates simply transferred their ravages to the shore. It was only in 1684 that is, one year after the destruction of the pirate kingdom in Formosa established by Koxinga (Cheng Ch'eng-kung 鄭成功), that navigation along the west coast of Kwangtung was again permitted. But piracy continued, and in 1842-1860 there were many encounters with the British navy. From 1863 onwards, conditions improved because both the Chinese and British governments constructed shallow gunboats to fight the aggressors. By the treaty of Tientsin 1858 Kiung-chow was included among the treaty ports, but it was not until 1876 that a British Consul was sent there and a Customs Station opened.

The revolution of 1911 did not bring much chaos but from 1924 to 1927, the communists caused considerable trouble culminating in 1927 when they committed many outrages including the destruction of valuable institutions and property. Among the latter was a valuable industrial museum at Hoihow which the progressive General

Huang Chiang had established to teach the inhabitants various modern trades and methods.

Since its first colonisation in 111 B.C. the population of Hainan has increased as follows:—

A.D. 1300	166,257
1370	291,030 (68,500 households)
1617	250,524
1835	1,350,000
1935	2,400,000 (including 400,000 aborigines).

INHABITANTS OF HAINAN

Hainan's population consists of an interesting conglomeration of peoples. The aboriginal inhabitants, now largely found in the mountainous interior, are thought to be of the Tai race of the Laos and Indo-China. The Chinese have taken possession of most of the fertile portions of the country, and the miaos, later arrivals from Kwangsi, have the steep mountain-sides for their portion.

Lois.—Du Halde, that great Jesuit writer, who compiled four volumes on the “Empire of China” in 1736, devoted a chapter to the aborigines of Hainan. He said that they were of small stature and of a reddish colour; they wore the hair pressed through a ring on the forehead and over it a small straw or rattan hat with two strings tied under the chin; a black or deep blue cotton covered the body from waist to knee. Both sexes wore earrings. Their arms consisted of bow and arrow and a kind of cutlass carried in their pockets which served both for carpentering and traversing in bush or forest.

On the other hand, Rocher, a later writer, says that the lois live in a hilly territory, difficult to reach, and the consequence of this confinement is reflected in their customs. They have acquired something of the brutal wilderness shown to the traveller by the configuration of the ground. Rocher describes the men as tall and agile with strongly marked muscles. They have the piercing eyes of the eagle, the cunning of the fox, and also at certain times a feline bestiality. They feel they are disliked by the Chinese, and consider themselves as hunted beasts, which, if they come out of their dens run the risk of being illtreated.

Born free, high in the hills, they have got into the habit of running over mountains and valleys. They know every single path or secluded spot of the forest where they wander about with a gun, ready to shoot a bird, as much as to rob a traveller. Poor, they have nothing to lose on their expeditions but often on the contrary, everything to gain. Men and children are certainly not impeded in their

movements by their clothing, a pair of trousers being sufficient to satisfy their elegant taste. On the head is sometimes a hat made of palm leaves, but as a rule they have only their long hair rolled up round their forehead. In certain places they wear a turban of blue cloth.

At their waist, and at the back hangs a kind of pocket made of bamboo in which are an axe to cut wood, a large knife and a pipe. In the front pocket made of an old piece of leather, or of a dirty cloth is a small provision of tobacco. In their hands they carry a gun, a bow, or the long pronged fork for capturing pythons. Their feet are not protected by any sandal and they do not seem to feel the asperities of the ground or the baneful cuts of thorns.

This endurance and toughness of skin are the result of training. Boys from 10 to 15 years of age are shepherds and ride on buffaloes with a small wooden drum attached to the neck. The buffaloes can do heavy work pulling a kind of sledge made of big poles of wood tied together with a cross pole. The boys delight in smoking pipes, which are of different kinds. Fond of hunting deer skins and horns they are excellent hunters and trappers. They have a clever way of catching pythons and other poisonous snakes. They trace the path of the serpent to its lair (usually in a cave) and wait patiently for its head to appear. Then with a strong pronged branch of a tree, the hunter prods its victim. During the struggle other parts of the snake appear. A smoking drug is then administered which stupefies the animal, which is then coiled into a circle and delivered into a basket. Snake-skins are valuable in the market while the flesh is eaten for its aphrodisiac effect.

While the men lead an outdoor life, the women seldom leave the village but look after housekeeping. When married they tattoo their faces. They have a very distinct dress, wear no trousers but a narrow skirt which is as wide as the hips, so that they have difficulty in walking. Over the shoulders to the waist they wear a coat under which is a piece of cloth to cover the front of the body when the coat is open. In the south, the clothing of the women is simple and made of common blue cloth. In the north, the lower part of the coat is ornamented with light coloured stuff on which are designs very like Arabic embroideries.

Sometimes the women wear a turban as in the Balkans. Their hair is simply fastened in a cord behind their head. The loi women wear no jewelry but very big earrings, shaped like S five inches in length. In some places, they wear half-dozen loops of wire around their necks, made not of silver but of brass.



伍處長乘飛機抵海口時攝影

Fig. 1 Arriving at Hoihow by air Dec. 1936. Dr. Wu Lien-teh on the right.



文昌之新街

Fig. 2. The modern city of Wen-chang—birthplace of Mr. T. V. Soong's father.



海口之街道

Fig. 4. A street in Hoihow, Hainan. A heavily loaded car carrying ten full-grown pigs outside, besides five passengers.



嘉積山區之一部

Fig. 3. A scene in the mountainous district of Kachek in the interior of Hainan Island.

海口海南醫院之正門

Fig. 5. Entrance of Hainan Hospital, Hoihow.





The men use arrows for shooting fish, being unacquainted with the use of nets or similar implements.

The dwellings of the lois are built of bamboo and thatch. In some regions the houses have floors of beautiful rattan several feet from the ground. In others there is a low seat around two sides of the room, which serves as bench and bed. The houses are built long and high, formed like boats with two stories in the middle. The roofs are made of knitted grass and shaped like inverted basins. They live upstairs and keep pigs below (as may still be seen in country districts of Jugo-Slavia). In cold weather the company gather around a genial campfire at one side of the room, each squatting on a little piece of wood, and men and old women alike peacefully smoke their long pipes, the coarse tobacco for which they cultivate themselves. They have several sorts of musical instruments, one being a peculiar kind of flute which is blown by the nose and gives forth a soft but very musical sound. They cannot read or write, but notch their arrows; these are sent instead of letters. Marriages are made by the choice of the young people themselves, the parents not interfering. It is said that one loi girl may meet several young men in selected rendezvous, and co-habit with them until her choice rests with a favourite or she begets a child, when she marries him and then lives a chaste life. Because of their illiteracy, the lois are often unable to count the number of herd they own, but get over this difficulty by collecting small pieces of stone, and throw one into a jar for every heifer born. The number of pieces collected at the end of the year indicates his status in financial circles. Like most primitive people the lois are great believers in evil spirits.

The term *loi* or *lei* or *li* is applied to a number of different tribes. First there are those who can scarcely be distinguished from the Chinese except by the fact that they speak an aboriginal language in their homes. Such people are found in the northwest of the island and are known by the district which they inhabit as Chiung-tao (瓊島), Lin-kao (臨高), or Tan-chow lois (詹州). The Chiung-tao lois are found even within three miles of Hoihow. Next there is a class of lois who have wholly submitted to the government but have retained their aboriginal dress and more or less their aboriginal customs. These are found on the border of the country inhabited by the Chinese and correspond to the tame lois described by early writers. The third class are the natives who now occupy the south central or hilly part of Hainan, into which they have been forced by successive waves of immigration of more highly civilized people from the mainland of China. This last class deserves special mention.

They may also be roughly divided into three classes according to the style of hairdress of the male portion of the population. In the class called "Large Knot" the members comb all the hair of their unshaven heads up to the forehead, where it is ingeniously tied into a knot and the remaining end wound around this and fastened with a string. They live toward the northeast in the district of Ting-ang. The southern lois twist the hair up on the top of the head where it is fastened with a long bone hairpin, sometimes made of the rib of an ox. The women in this section tie the hair as a horse's tail is tied in muddy weather. This knot is at the side of the head and gives them a decidedly jaunty appearance. The southwestern lois part the hair from ear to ear over the back of the head, tie the forepart in a knot on the forehead and twist the back part, bring it over one ear, and fasten the end into the knot in front. The tiny little wooden comb with which this toilet is made is then stuck into the knot.

The lois obtain a living by farming and the chase. Very little is planted except rice, of which they have several good varieties. The fields are prepared for planting by buffalo feet treading the stubble down into the mud. When the grain is harvested, only the heads are cut off and stacked in the village threshing ground, where the grain is trodden out by buffaloes. The upland is cultivated only in small patches where sweet potatoes and a few greens are planted. They have scarcely any fruits, but anything that is alive is meat with which to dress the rice. The women work along with the men, and besides weave the coarse cloth of which their clothes and blankets are made.

After harvest the young men amuse themselves by getting up hunting parties, when spears, bows and arrows, and guns (the latter in surprising numbers) are brought out for use. The chase usually ends in rounding up a deer, wild boar, or some jungle fowls. They observe a curious custom in the division of the game. The one who hits it first gets the head and hind quarters; if the animal did not drop at the first shot the one who hit it the second time gets the fore quarters, and all the others who participated in the hunt and even those who happened along at the butchering are given a piece.

They have no market towns. Trading is occasionally conducted by companies of from ten to forty men who take loads of rice, skins, deerhorns and sinews, dried mushrooms, dried canna leaves, roots for dyeing purposes, and other forest products several days' journey to some Chinese market, where they receive salt, clothes, trinkets, or ammunition in exchange. The provisions for the round trip are carried with them, and their meals are prepared on the banks of the streams in the most primitive fashion. Rough coconut shells

海口醫師全體與伍處長合影

Fig. 6. Men and women doctors of Hoihow, Hainan. Dr. Wu Lien-teh seated in centre.



海南内地苗人家庭之一

Fig. 7. A Miao family in front of their hut in the interior of Hainan.



海南内地之苗衆

Fig. 8. A group of Miao in their native village, Hainan.



漢裝之苗人家族

Fig. 9. A Miao family group in Chinese clothes.





answer for bowls and any two little sticks do as chopsticks. The fire is started with flint, and having once gotten a light, they carry it from place to place on a rope of twisted straw or a knot of wool.

Apparently they have no ancestral or idol worship except when such has been introduced by the Chinese. As a visible object of worship, a three-sided stick, driven into the ground beside the door of the house and on which a face has been drawn, is sometimes seen. Or a small board with a rude drawing and a few straggling characters upon it may be fastened to the door of the house. One woman who had been ill was seen to take branches of trees or shrubs and hang them at the gable end outside the house. The dry branches thus hung at nearly every house told where sickness had been. They have priests who exorcise evil spirits. They have a strong belief in witchcraft, and the belief in their power to bewitch extends to the Chinese, who will not make a journey into their country without first making a special appeal to the gods for protection. After a hunting party the head of the game is roasted. In the evening the young men gather in the hut of the successful hunter, and after some chanting the roasted head is offered to spirits.

With regard to the *loi* language, it seems to be a branch of the Chinese family, the consonants being wanting as contrasted with Japanese and Formosan. There seems to be some relation with Siamese; for instance, *nam* for water occurs both in *loi* and Siamese. In other words, the *Loi* dialect of Hainan occupies a position midway between aboriginal dialects of Siam and those of the interior of China. At least half the words in the Hainan vocabulary resemble that of Kweichow aborigines.

There is one chieftain for each village selected from the experienced elders. This job he holds until his death. The chief possesses full power to decide the simple problems occurring among his people. The government has also recognized some of the *loi* headmen as chiefs, and made them responsible for certain districts. All classes of the *lois* have the privilege of appealing to the Chinese magistrates to settle their disputes. On account of the distance which they have to go in some districts in order to reach a magistrate, the government has appointed two deputy magistrates especially to have charge of *loi* affairs at Nan-feng (南豐) and Ling-men (嶺門). Of late years no great *loi* raids have taken place, but in earlier times whole ruined villages were witnesses to their enmity with the Chinese.

Miaos.—The *miaos* retain many ancestral traditions and speak Hainanese. They are supposed to inherit Pan ku's degree of not paying taxes or ferry charges, also freedom of cultivating the hills, marrying among themselves and the right of protection from local

magistrates. To cultivate rice, the miaos burnt the bush and timber from the hillside, sowed one crop, and the next year did the same thing to another hill. Their dress and habits are different from the Chinese. The women do their hair simply and gather it with a small embroidered handkerchief of blue cloth sometimes bordered with riband of red. Dress consists of blue coat with narrow sleeves which reaches the knee, their narrow skirt is slightly longer than that of the loi. They have a pretty pattern on the sleeve and jacket. The miaos have their own tongue which is not easily understood. Mandarin is spoken in Tamchow city and neighboring villages, said to have been imported by the poet, Su Tung-po (1036-1101). The three dialects of Hainan, Amoy and Swatow are closely related. The Hainanese tongue resembles the two others and is also spoken in the Peninsula of Luichow.

The miaos here are of the same stock as the maotze in Kweichow, Yunnan, and Kwangsi provinces, and indeed say they emigrated here from Kwangsi. Inquiries made of missionaries working among miao people in other places have as yet failed to reveal a similarity of language or dress. They are much different from the Chinese in customs, manner of dress, habits of life, and temperament. Their language is not a written one, and their speech has many words similar to Cantonese or Mandarin. They are a happy, light-hearted people in spite of their privations and bitter toil, and singularly open and responsive to any who gain their confidence.

A miao village is a picturesque sight. Always it nestles in a valley surrounded by mountains or hills on all sides, and near a river or small stream. The houses are made without brick, tiles, or nails, from the material at hand. The beams, end poles, and ridge-pole are hardwood timbers; the roof of fan palm, rattan, or coarse grass thatch laid on bamboo poles; the walls of small bamboos chinked with mud or else of split bamboo screens; the floor of pounded mud. All fastenings are made with rattan or bamboo withes. The walls stand about five feet high but the roof projects out to within two feet of the ground, making it impossible to stand upright on entering unless at the end of the house, from where one can walk along the wall to the door and enter without stooping. The door is almost in the middle of the usually three-room house. Cooking is done on a square pedestal made of earth, where the open fire is kept continually burning like that of the Roman vestals. This fireplace furnishes light at night besides smoking out insects, and in the day enables smokers to light their pipes. No chairs are provided. The houses are set with little regard to order. If a village has been established several years there are fruit trees such as papayas and well-established gardens near the houses.

Almost all the utensils are made of wood, from the water buckets and wash basins to the rice mortars. Hoe blades and knives are purchased from traders, and so too are the unbleached cloth used for garments and the silks with which the women embroider their girdles and kerchiefs. The costume of the men differs from that of the Chinese only in the way in which the coat fastens. The women have a peculiar form of dress, consisting of a long coat reaching to the knees and tied at the waist with a red girdle, a short skirt, dark blue puttees tied with red, an exquisitely embroidered head kerchief, and sometimes a pointed hood reaching to the shoulders. The goods are all dyed a dark blue by the women after they are purchased. The skirts are figured around the bottom, the pattern being put on the undyed goods with beeswax, through which the dye cannot penetrate and which is afterwards removed. All the symbols on the kerchiefs possess meanings but the women have difficulty in explaining them in Hainanese. The mothers carry the babies on their backs, tied much as Cantonese women tie their babies, with a big palm leaf stuck under the shoulder straps to protect the child from sun and rain.

The miaos do not know how to raise rice in fields covered with water, but instead clear the mountains and plant upland rice, Indian corn, sweet potatoes and a few vegetables until the fertility is exhausted and then after having thus used all the land near at hand, move their whole village to another spot and begin again. One woman less than fifty years old said she had moved twelve times already. The men and women work together apparently in everything except hunting, which is the man's job, and sewing, which is the woman's. Expert as they are, they often cut themselves while working in the forests, and suffer from great sores and ulcers due to their lack of proper remedies. Thorns also cause many sores, and all too often a glancing blow of a big knife may sever a tendon and leave a man or woman a cripple for life. Broken bones cause great suffering, as they know nothing of setting such fractures.

The fishermen use a noose on the end of a stick. To catch large quantities of fish, they dam the river, using both fine and coarse nets. Several pounds of powdered bark are then poured into the stream.

This either kills or stupefies the fish, which rise to the top of the water and are easily secured. Six or eight villages will combine for such a fishing and from one to two thousand pounds of fish are often procured at a time. What is not eaten fresh is salted down with a kind of popped rice for future use. Hunting is carried on with crossbow and poisoned arrows or with guns. Antelope, wild boar, porcupine, and occasionally a bear are the usual haul.

Each village has from eight to thirty families, with a chief at the head, although the office apparently is not hereditary. One man is

recognized by the Chinese authorities but does not seem to have any more power among his own people than his own personality can gain for him. The miaoos are a peaceful and peace-loving people, often suffering at the hands of the lois and various robber bands. They are monogamous, for as one woman put it, "If a man can't control one wife, what would he do with two?"

Chinese.—As said before, Hainan was definitely occupied by the Chinese during the reign of the Emperor Wu Ti, 111 B.C. It was recorded that 23,000 immigrants were landed in the north, and as they progressed, the indigenous tribes were driven toward the south and mountainous districts. The central government also used the island as an outpost for banished officials. As far back as the T'ang dynasty, 847 A.D., Prime Minister Li Teh-tu was banished thither. During the Sung dynasty the foremost poet, Su Tung-po, because of differences of opinion with Minister Wang An-shih (王安石) (originator of the League of Nations idea) was sent to Chiung-chow in 1095. Minister Li Kang of the same dynasty was also banished to Hainan.

Later many emigrants came from Fukien province, so the Hainanese dialect resembles Fukienese to a certain extent. The district cities of Ngaichow (崖州) and Tan-chow (詹洲) are Mandarin-speaking, as are also the market of Nodoa (那大) and several other markets in the western part of the island. Near San-ya (三亞) in the south is a Mohammedan village with its mosque, inhabited by descendants of wrecked mariners centuries ago. Cantonese merchants are numerous in Hoihow and in some of the interior towns. The boat population of Hoihow, San-ya-kang, and a few other coastal towns is identical with the sampan people of Canton and Hongkong. Wheelbarrow men from the peninsula add their dialect to the collection. There are also many colonies of Hakkas, some of whom have thrived exceedingly overseas.

The Hainanese of the present generation are therefore a mixture of several Chinese stocks, principally Fukienese, intermarried to a slight extent with the aborigines. The males usually have fair skin, while the women are handsome and well built. Here and there are seen the flat nose and silky hair of the Malayan type, whose mothers have been brought home from Singapore. The people are quiet, law-abiding and industrious, though it must be confessed that the women undertake more heavy work than the men. Save for disturbances between inhabitants of different languages and the ever-present danger of pirate attacks along the coast, the island is calm enough in ordinary times.

Many of the men because of poverty travel by junk to Siam, the Straits Settlements, Netherlands Indies, or Burma, where they



海南警察檢查獮人之情形

Fig. 10. Hainan police inspecting
Loi inhabitants, Hainan.

黎人婦女

Fig. 12. Girls of the Ba-sa-dung Li, Da-
kung, Hainan.



海南內地之苗棚

Fig. 11. Typical aboriginal huts in the
interior of Hainan.

挑水之伎人婦女

Fig. 13. A Ki woman carrying water, Fan-
hau, Hainan.





become house servants or ships' boys, work on rubber plantations or in mines, or go into higher business. Before the war large coolie steamers also stopped at Hoihow to take on men bound for the south. It is often a surprise to the traveller in the interior to be addressed in perfectly intelligible English by a man who has returned from the south. Until 1910 these men were not allowed to take their wives with them, and as a result many young wives in Hainan were virtually widows without a widow's freedom, while the men take second wives in Malay and raise families there which they sometimes bring back to Hainan. The communist agitation of 1926-27 wrought much havoc to the Island.

Hainan itself has produced some famous sons including Minister Hai Jui of the Ming dynasty and Pastor Soong Yao-ju (宋耀如) whose distinguished children, Madame Sun Yat-sen, Madame H. H. Kung, Mr. T. V. Soong, Madame Chiang Kai-shek and Mr. T. L. Soong have added a glorious chapter to China's republican history.

MOUNTAINS AND RIVERS

Not much is known about the mountains of the interior, for the region is seldom touched by Chinese or foreigners. The most important of the ranges are the timber-covered *Five-Finger Mountains* (Wu-chih San 五指山), so named because of the five great peaks spread out like the fingers of a hand. The natives think that spirits guard the tops of these mountains so that it is impossible to climb them. These form the main watershed of the island and are reputed to be over 6,000 feet high. The *Seven-Finger Mountains* are an inland range which can be seen from the southern coast. From Nodoa the western slopes of the Lotus Range are visible, with the still higher Loi Mother Range behind, and the Red Mist Mountains to the south. On a clear day two beautiful peaks known as Nan-men Ling and Hsi-ho Ling can be seen from Kacheck. These peaks are the guardians of the Miao villages which cluster about them and their surrounding foothills. The coastal range on the southeast makes even the winter season in southern Hainan a warm one, as it shuts off the cold north winds. In the south central part of the island two spur ranges break off from the central mass and reach to the coast. At the foot of one range many pretty little islands nestle close to the shore. The highest peak of the other is seen on the sky line almost directly north of Lu-lah. On one side this peak is a sheer precipice and on the top it is flat, so that the whole appearance is quite striking. Once the country is opened up, the peaks of Hainan will attract venturesome tourists.

The northern third of the island is a comparatively level plain broken by occasional low peaks, sloping gradually up toward the ranges

of the interior and deeply cut and roughened as it comes up to the foothills. Near Hoihow two peaks known as "The Hummocks," extinct or at least quiescent volcanoes, are the outstanding landmarks of that region.

Through this plain flows the Golden River, the largest of the three river systems in the island and also the most important commercially. In many places it is fully a quarter of a mile wide in ordinary times, but shallow, and in other stretches quiet and deep. In flood times it is a raging torrent.

About thirty miles up the Golden or Po-chang River from Hoihow (which lies on its left bank) the remaining two thirds of the island fall into three divisions. To the east are the plateaus of "Yellow Bamboo" and the coastal plain below Kacheck, through which runs the Kacheck River, second in importance only to the Golden River. It takes its rise among the foothills of the Five-Finger Mountains and flows to the sea through a gap in the lower range. Along this river, about ten miles above Kacheck, are the boiling sulphur springs which are another evidence of volcanic activities in the island.

The central part of the island is the most mountainous. It and the western portion are drained by the Ch'ang-hua River (昌化江) and its tributaries. This river also rises among the mountains and for half its course flows through deep valleys and dense forests where the loi people dwell, and at last turns west and gushes over the sandy plains to the ocean. Near the coast this river's shallowness and treachery are only equalled by its great width. Quicksands are numerous. After storms in summer this river is said to rise rapidly and do immense damage. In fact after seeing any of the rivers in flood one does not wonder at the solid buttresses of the stone bridges which have been built in some places.

FAUNA AND FLORA

The forests of Hainan abound with strange and interesting animals. Wild boar prey upon the gardens and fields of villages near the jungle, and many ingenious methods of frightening them away are used. Small antelope and other species of deer are numerous and occasionally provide good fare for the table. The porcupine with his sharp-pointed black and white quills, often nine or ten inches long, is a formidable enemy to face unless one is armed. Foxes are common marauders of the compounds, so the farmers hang their woven basket coops up under the eaves of the houses, and the hens sedately climb up a portable ladder to their refuge at night. In the mountains the hunters with their poisoned arrows sometimes shoot what they call a "flying fox," a beautiful furry creature with soft wings about six

inches wide and eighteen inches long. A small animal like the South American armadillo burrows into graves. Squirrels frisk about on the coconut trees and an occasional rabbit is caught by the dogs. Monkeys are native to the southern part of the island. Bears are sometimes found and it was through an injury which a bear inflicted upon a miao chief that the opportunity came for mission work among those people. Varieties of snakes, including the large, poisonous python, are encountered and often provide choice dishes to the gourmet. A skilful way of catching these has been described. Innumerable variety of fish are caught in the ocean; most of these have been identified by investigators sent by the Academia Sinica.

Hainan is also an island of magnificent trees, dainty ferns, fragrant flowers, and delicious fruits. Far up in the mountains are the mahogany, rosewood, and other trees from which material comes for building purposes, and some of the woods from which furniture can be made are equal to those of any other part of the world. General Huang Chiang owns a table made entirely from a cross section of an aged tree several feet in diameter. The banyan flourishes here, and its buttresses often form a perfect half circle like some protecting patriarch near an old temple falling into decay. The coconut and betelnut palms grow luxuriantly and produce considerable income.

Air ferns look like immense birds' nests in the crotches of the trees. Climbing ferns beautify the hedges, filmy ferns the roadsides, and the maidenhair, the Boston fern with many variations, and the curious walking fern are everyday sights. Orchids are found in the jungles, some inconspicuous, some gorgeous. The pitcher plant and the sundew, with their voracious appetites for ants and other insects, are a curiosity to those not accustomed to carnivorous plants. The passion flower, honeysuckle, and wild jasmine run riot over the hedges. Flowering trees are found too, the cotton tree and the Philippine dap-dap being perhaps the most conspicuous with their bright red blossoms glowing in the warm spring sunshine before the leaves have come.

Fruits exist in abundance—papayas (mu-kua or melons that grow on trees), breadfruit, jackfruit, lychees, mangoes, coconuts, custard apples, bananas, guavas, pine-apples, figs, several varieties of berries and also several varieties of citrous fruits. Among the latter are limes, pomeloes, and a variety of green oranges even more delicious than grapefruit.

The flora of Hainan is closely related to that of the southern coast of China and of the Philippines, but has variations peculiar to itself. Medicinal plants, usually wild, grow in abundance; two of these, *galangal* (Kao-liang chiang *Alpinia galanga* 高良薑)—ginger-

like pink root—and *huo hsiang* (fragrant weed, *Stachys betonica* 蕃香) a specific for diarrhoea and dysentery figure prominently among the exports from Hoihow.

CLIMATE

Max. T. observed in 1935	38.5 C on April 10.
Min. T. " " "	10.5 C on Feb. 12.
	Dec. 14.
No. of rainy days " "	149
Rainfall " "	1446 mm. in August.
Max. pt. Barom. " "	772.9 mm. on Jan. 13.
Min. pt. " "	745.2 mm. on Oct. 8.

Hainan lies in the tropical zone. During the summer season the thermometer ranges steadily from 80° to 95°F. The sun heat is intense and one does not stir out during the day without pith hats and usually umbrellas. The humidity is so great that the feeling is that of a blistering summer day following an evening of shower. During the winter the thermometer occasionally drops to 45° but usually remains about 50°, never lower unless the sky is cloudy. Frost is practically unknown. From the first of October the weather is generally fair until January, with an occasional day or two of rain. In January or February comes a month of very damp weather. Then the air is continually saturated with a fine mist. It does not rain, but the air is so saturated with moisture that no rain could come through it. Everything in the house moulds, clothes and books get damaged unless special care is taken. In March and April, when the monsoons blow, the air is very dry, the grass becomes parched and brown. This does not last long, for afternoon thunderstorms soon begin, usually after a week of preparatory clouds and mutterings, with a tremendous downpour. During the summer thunder showers are frequent but do not last long. During July, August, September, and even later, typhoons may be expected, though there are often years when none appear. On the whole the climate in the northern and central parts of the island is quite livable, as there are few days when a good breeze does not relieve the heat, and the nights are cool. The southern part is much hotter, the evenings being almost unbearable. Mosquitoes are plentiful and in the country cause much malaria.

COMMERCE

Hainan exports through the port of Hoihow the following articles: Pigs, poultry, cattle, sugar, coconut, hemp, sesamum seeds, hides, timber, eggs, salt and coffee.

The pigs and poultry are famous and much liked because they feed upon farm produce and not upon waste as is so often the case in many parts of China. But the land is also most suitable for the cultivating of rubber, jute, cotton, tobacco, tea, oranges, pineapple and other tropical fruits. Some far-seeing Chinese industrialists from Malaya, headed by the late Foo Choo-choon, did plant rubber trees some twenty-five years ago, but because of constant political upheaval these have been neglected.

In 1935 a rubber plantation of considerable size near Nodoa was in the market for \$2,000.00, but the deal did not go through, and the following year the owner realized \$10,000.00 from the tapped rubber alone!

Because of the fertile tropical soil, sister industries like fats, frozen meat, bacon, tanneries, canned fruits, etc., can be produced in large quantities in addition to rubber and jute which are needed for modern requirements. Even such a valuable medicinal tree as *cinchona* can be grown on the hilltops for the production of quinine.

As for minerals, both tin and gold have been found and these await exploitation from the proper quarters. Rice could be widely grown both in the hills and valleys instead of being imported in such large quantities as at present. In this connection our people can take a lesson from the Dutch authorities who have utilized every available acre of land in Java and Bali for the self-sustenance of the 60,000,000 inhabitants. The fertile hills and valleys offer ideal pastures for cattle and sheep.

The main articles imported into Hainan are rice, cotton, yarn, shirting, flour, kerosene, oil, matches, ginseng, ironware, general merchandise, etc.

The Customs revenues collected at Hoihow are:

1930	878,351.38
1931	1,508,007.75*
1932	1,525,973.25*
1933	1,017,607.45
1934	847,346.86
1935	987,638.07

SHIPPING

Steamship connections between Hoihow and other ports are as follows:

*These figures include collections from Luichow Stations which were placed under another district from November 1, 1932.

Port	Yearly Av. 1926-1927		Yearly Av. 1927-1928	
	No. vessels cleared	%	No. vessels cleared	%
Canton	100	9.3	69	5.6
Hongkong	427	36.1	519	42.4
Haiphong	133	11.3	114.5	9.3
Pakhoi	175	14.8	203	16.6
Bangkok	73	6.2	83	6.8
Singapore	78	6.6	65.5	5.3
Other Ports	186	15.7	171.5	14.0
 Total	 1,182	 100.	 1,225.5	 100.

No. vessels and tonnages entered and cleared for foreign and Chinese Ports

	Foreign Countries		Chinese Ports	
	No.	Tonnage	No.	Tonnage
1932	699	926,686	227	281,778
1933	713	908,619	225	258,503
1934	771	866,098	246	296,406
1935	852	947,110	326	409,695
1936 (Jan.-Nov.)	767	845,189	255	352,479

Regarding shipping, only steamers of 3,000 tons or under now visit Hoihow. These belong to Butterfield and Swire, Norwegian, Douglas and French companies. The first two firms run steamers to Singapore, the second to Siam, the third to Annam and Kwangchowwan and the fourth only between Canton, Hongkong, Hoihow and Pakhoi. B. & S. also have steamers to northern ports.

There are practically no Chinese steamers calling at the port. The largest steamers ply between Hoihow and Singapore and Siam carrying about 3,000 emigrants monthly to the two last ports. Sailing junks entirely Chinese still do a considerable traffic both with China and the neighboring territories.

Hoihow port serves also as the third emigrant port of China, coming after Swatow and Amoy. In 1918 passengers (mostly emigrants) leaving Hoihow numbered 12,865; this number was increased to 50,341 in 1924, and the maximum was reached in 1930 with 51,335. Since then the number has gradually decreased. The figures for 1933, 1934, 1935 being respectively 19,718, 32,362 and 33,430.

This constant emigration into other territories means a serious drain of the most virile elements of the population and should be checked as far as possible by improvement of farming, agriculture and industries at home. So soon as the Hainanese find profitable occupations, and are not too heavily taxed, they will prefer to work on their own soil. Not a few of the older emigrants have returned to their villages, built comfortable dwellings and introduced modern commercial knowledge acquired in foreign countries which have given them pro-

tection and prosperity. Their services and their capital could be worthily utilized for the development of their own land. Apart from that, the authorities could show further encouragement by welcoming foreign as well as Chinese investments for developing these tremendous resources especially tin-mining.

HEALTH CONDITIONS

The climate being tropical, most of the commoner tropical diseases are encountered in Hainan. Of these, malaria takes the lead attacking the indigenous tribes as well as Chinese. In a study of this disease, Dr. H. F. Burkwall of the American Presbyterian Mission found the spleen enlarged in 30 per cent of all persons examined. He also said that pulmonary tuberculosis was quite common, including involvement of the larynx. Dysentery also prevails while venereal diseases are widespread. Smallpox outbreaks recur periodically. Deficiency diseases like beriberi are not evident.

Owing to general ignorance of health matters, childbirth is still considered an "unclean" process, and parturient women are obliged to undergo labour in dark and insanitary places, sometimes in the wash-room or fields. The result is a high mortality among both mothers and infants, and it is not uncommon to find only one or two survivals among a family of 12. The few mission and Chinese hospitals are helping to stop this state of affairs and their maternity wards are always filled to overflowing, but the majority who cannot afford to pay still run the old risks. The most troublesome infection and one that saps the strength of the inhabitants is malaria, which has more than once been responsible for the defeat of armies and evacuation of invading parties.

Any systematic development of the resources of Hainan should also take into consideration the control of this disease, so that the man power may be conserved and utilized to its fullest extent. In other words, the organization of a proper health service in Hainan is as necessary as the employment of engineers and scientific implements. Nor should the needs of veterinary and agricultural science be neglected. For again and again have epidemics of rinderpest, swine-fever and fowl cholera decimated thousands of farm animals, which suitable inoculation and isolation could stop. Valuable fruit trees, like coconut, are not scientifically supervised and hence are ruined by dangerous parasites.

SUGGESTED PROGRAM OF RECONSTRUCTION

A few words may now be devoted to a summary of the foregoing pages accompanied by a suggested program of reconstruction. It

has been seen that Hainan is the most southerly portion of China within the tropical zone. It has five hundred miles of seacoast with excellent natural harbours awaiting development. The only port of importance at present is Hoihow situated in the north opposite the mainland, thirty hours steaming from Hongkong and three hours by airplane from Canton. Unfortunately the sea here is shallow and treacherous, so that the movements of passengers and cargo are practically impossible in rough weather. The fine harbour of Manui (Ma-li) lies only thirty miles to the west and can be connected with Hoihow by both road and rail. I will not deal here with its immense strategic value for that is obvious to all.

Present tendencies point to the development of highways as being more economical and serviceable than railways, and as such, the construction of more roads should be the first consideration of the government.

During my visit to Hainan, nothing impressed me more than the extraordinary uses to which second-hand passenger cars were put in conveying ten to twenty heavy packages on the running boards in addition to six passengers inside. I also saw cars transporting ten to twelve pigs, each weighing 200 pounds encased in a large bamboo basket from the farm to the market, sometimes fifty to eighty miles away. These means are adopted because of heavy taxes upon both trucks and cars.

Even the most backward inhabitants appreciate the advantages of modern transportation, for although they may pay more, the time saved is great, and they can obtain quicker returns.

The soil is everywhere fertile and can produce unlimited quantities of rubber, sugar-cane, jute, coconut, areca-nut, coffee and all sorts of tropical fruits. The planting of rubber should be particularly encouraged since Hainan is the one place in China where this valuable commodity can be properly cultivated. Because of its luxuriant vegetation, all sorts of farm produce like hogs, cattle, sheep and poultry thrive and can be exported in enormous numbers. It is said that in the interior a full-grown bullock costs only \$5.00 and a sheep \$1.00. Fats obtainable from hogs, and oil from copra being much in demand abroad, these industries should also be developed and encouraged.

Because of the abundance of fresh produce, there is a great future for the canning industry.

At present only Hainan coffee is known outside the island, but the export of this beverage is still in its infancy.

In addition to the government's initiative, banking, commercial and industrial circles should take a hand in developing the resources.

For thirty years or more, oversea Chinese from the South Seas have attempted to do their share but have been handicapped by the disturbed state of the country, resulting in discouragement and frequent losses. The recent visit of Mr. T. V. Soong, accompanied by the highest officials of Kwangtung, has given a great impetus to the reconstructive efforts, and this should pave the way for permanent achievements.

The prosperity of Malaya and Formosa should be an incentive to Chinese as to how a wild virgin territory can be developed with benefit to both government and governed. From Malaya enormous quantities of tin and rubber have for years been exported with profit to thousands of Chinese, while Formosa owns practically the world's monopoly of camphor. To achieve the maximum results, all parties should work hand in hand aiming at mutual rather than individual success. Moreover, the land could easily support a population of 6 million or over as compared with the present 2½ million.

The outlook for Hainan is better today than at any time in its history. The central government has taken the lead in reconstruction supported eagerly by the provincial Kwangtung government. The appointment of General Huang Hsiang to the post of Governor of the island is another incentive to cooperative efforts. The beneficial work done by this enlightened and hard-working official ten years ago is still remembered by the masses, and though his Industrial Museum and other buildings were destroyed by the communists in 1927, the roads that he built and the spirit of progress that he instilled still remain with the people.

The need of a properly organized health service working side by side with other departments of the government has been mentioned. Unless the country is made habitable by the extermination or at least control of preventable diseases, permanent prosperity cannot be guaranteed.

Lastly, in order to deserve the name of "Paradise", serious efforts should be made by those concerned, to make tourists and visitors comfortable by the establishment of hotels at the principal cities like Hoihow, Chiungchow, Wenchang, Kachek and Nodoa. The mountainous scenery around the Five Fingered and Seven Fingered Mountains is unparalleled in beauty. In addition, the presence of almost half a million primitive inhabitants, like the lois and the miaos who still stick to their queer dress, and coiffure, will continually attract students of human races.

With its abundance of wild animals and game, Hainan also offers vast possibilities to the sportsman and naturalist. The "Paradise"

is there—it only awaits development so as to serve the vital needs of China and her people.

REFERENCES

F. Mayers: Historical and Statistical Sketch of Hainan. N.C.R. A.S. Jl. 1871-72

R. Swinhoe: Aborigines of Hainan. *Ibid.*

H. Stuebel and Li Huan-min: Preliminary Report on an Ethnological Excursion to Hainan (Tr.). Tokyo, 1933.

Various books in Chinese on Hainan.

Miscellaneous Reports by Am. Presb. Mission, Hainan.

Chinese Customs Reports.

THE MOVEMENTS OF PEOPLES WITH SPECIAL REFERENCE TO CHINESE EMIGRATION

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7. CONCLUSION.

1. DEFINITION

Migration is the shifting of peoples from one place to another. Throughout the history of the world there have been these movements; whole populations have sometimes been transported, while individuals have ever sought adventure and livelihood in lands more fertile or attractive than their own. Departure of persons from one country to settle in another is termed *emigration* from the first country and *immigration* into the second. The persons concerned are termed *emigrants* of the country of origin and *immigrants* of the country of destination.

There have also been migrations or transmissions of cultural objects and ideas which frequently have little relation with movements of peoples—what are termed *cultural drifts*—but with this aspect we have no concern in this thesis.

2. GENERAL SURVEY OF WORLD MIGRATIONS

(a) *From the earliest times to the 16th century*

The necessity for procuring food being the basic requirement of the human race (as it is of all living matter), it is not surprising that most primary migrations of mankind may be traced to the search for sustenance. The continuance of a group of people in one place is dependent upon the more or less steady supply of food products from the soil, as the necessity for tilling and sowing tends to anchor a people to the land. Any conditions that cause serious fluctuation in the yield of the land are likely to give rise to unrest and movements of individuals or even communities thus set in motion.

During most of the vast period of time since man has been in existence, he has merely been a collector of food or a hunter. So long as the products of the soil are abundant or game is plentiful, he is able to live in fair sized communities, but as soon as his numbers increase out of proportion to the available food supply, the need for migration becomes urgent. Where this movement takes place on account of the necessity for moving to areas more suitable

at a particular season for growing a certain type of crops, a return migration following when the home regions become again capable of supporting large groups of individuals, it is to a certain extent voluntary although dictated by the struggle for existence. Two examples may be quoted. During the winter months the Eskimos live on the sea coast where they can catch seals on which they mainly depend for food; when summer comes round, however, they shift to inland regions where they can hunt reindeer or the musk ox. The enormous migrations of the natives of Shantung and Hopei every year to the Northeastern Provinces where they till and hunt, and their return inside the Great Wall to enjoy the fruits of their labours beside their own hearths, is another example of "voluntary" migration dictated by necessity.

Compulsory movements are the result of changes in climate or of geographical conditions which cause a complete shifting of the flora and fauna. The following instances may be cited: fluctuations of temperature in the glacial periods of northern latitudes, shifting of the rain belts further south, dessication, elevation or depression of land, changes in the coast line, and so on.

It is clear that during the advent of a glacial period the increasing fields of snow and ice would drive the people who then lived in north-west Europe further south where livelihood was possible, and similarly there would be a southerly shifting of peoples who were used to a mild climate. We thus understand why the wide belt of northern Africa now known as the Sahara desert must have been in those far-off times a well-watered, habitable country of grass-land. Similarly the arid wastes of western Asia must once have been fertile land. When the ice retreated, the rain and storm-belts also retreated north so that these habitable areas once more became dry and thirsty lands. There were therefore extensive migrations of people as each glacial period came and went. In the 14th century the devastating storm floods of the North Sea and the Baltic coasts resulted in cold periods and inundations in the northern countries with their consequences—famine and migrations of the population. About 1,800 years earlier, similar storm floods impoverished the people of the late Bronze Age of Scandinavia, and land elevation and deterioration of climate occurred throughout the North Atlantic Ocean. It is possible also to connect the invasions of the Teutons and the Cimbri into Gaul (part of what is now known as France) and later into Italy with a big inundation of the sea which had destroyed their homes in Jutland (about 6th century B.C.). Other examples may be quoted. In the 10th and 11th centuries the comparatively mild climate of Iceland and Greenland attracted the

Vikings from their ice-locked Norway. About three hundred years later, the advance southward of the ice belt caused the Eskimos to move southward to Iceland and Greenland; the Norsemen (Vikings) were gradually wiped out. The causes of this must be laid to the cutting off of communication between the Norse settlers and their homeland, resulting in lack of corn, flour and cattle, unaccustomed food conditions, disease and probably decreased birth-rate.

There is also evidence that in Asia movements of peoples were in ancient times dependent upon climatic changes. Thus in the Near East there was progress and peace, except for dynastic wars, when the rain-fall was sufficient, and migrations of the peoples of poor lands and deserts when it diminished. The Hebrews migrated to Egypt because of famine in their native land (1,600 B.C.).

The direction in which all migrations take place depends upon geographical factors. People will usually seek conditions similar to those to which they have become accustomed. This is on the whole true for modern emigrations and colonizations. There is a distinct tendency for people to emigrate to similar latitudes or to countries with a climate that resembles that of the home country. Northern Europeans seem to experience greater difficulty in acclimatization in tropical countries than do South Europeans. The problem is complicated by different habits of life, by tropical diseases, and by the effects of heat and humidity. Hence although Europeans may be able to live in the Tropics by adopting suitable precautions, their descendants have not been found capable of spending all their lives there and indefinitely propagating the race away from their natural surroundings. Transplantation of a people which has to be continually replenished by fresh immigrants and is diminished by the return of the children to the home country cannot be described as true migration—it being merely an occupation of the country. That is why Chinese make the best immigrants, as they are very adaptable to strange conditions of life and climate; once they emigrate to far countries, they settle down and bring forth descendants who carry on without having to return periodically to their motherland. When they do go back it is not because of the unsuitability of their adopted surroundings but because of their ingrained sense of patriotism and the constant faith in the destiny of their country.

In early ages voluntary migratory movement took place only along lines of least resistance. Definite barriers which could not be crossed, or only with great difficulty were ice and snow, oceans, inland seas, great mountain ranges, swamps, deserts, etc. Small bands of individuals might under dire stress accomplish the hazar-

dous journey but these obstacles would normally prove too great for whole communities. On the other hand, grassy plains and plateaus, fertile regions, etc. afforded highways for migration. A densely populated region may also prove a barrier to migration, for the inhabitants, if strong enough, would naturally prevent strangers from entering their country. The present day system of quotas is an example of a strong country obstructing the entry of immigrants. Political and racial considerations are now super-added on to economic desiderata. Barriers such as the Great Wall of China have altered the whole course of history. Thus the premature downfall of the Roman Empire may be said to have been largely due to the fact that, foiled by the impassable barrier of the "Ten Thousand Li Rampart", the Huns switched round in their career of conquest to swoop down upon the European plains.

Modes of transport have always played a vital part in large movements of population; of these, domesticated animals and boats are the most important. Beasts of burden like the camel, the reindeer, draught cattle, horses, asses, etc. have been the means of drawing wagons, carts, sleds, and of carrying men and equipment long distances. A pastoral people can only migrate along a country which affords sufficient pasturage and water. Diseases which require the presence of intermediate hosts for propagation to man have in the past acted fatally against the success of mass or individual migrations. Thus the tsetse fly, ticks and other insect pests have proved barriers to movements of population, especially in Africa. The horse on account of its rapidity has rendered possible raids on strange lands, and acted as the advance guard for the slower mass invasion of communities burdened with their flocks and herds. We may say that wherever the horse has been taken it has facilitated human movements; and so to a lesser extent has the ass.

Again, large stretches of water must have proved very effective barriers to migration for thousands of years before the modern age of transportation. Various types of boat were used in those far-off days to bridge rivers and lakes, such as, rafts, dug-outs, skin-covered baskets, bark canoes. It was not until canoes were provided with side-planks that seaworthy vessels were available for oversea commerce, warfare and colonization. The invention of outriggers to steady such craft occurred in the Indian Ocean, and in conjunction with other discoveries, was responsible for the migration of Polynesians all over the Pacific Ocean.

A further factor in determining the migration of peoples is the possession of more deadly weapons or improved implements for daily use. It is clear that a community or a people that is poorly

equipped with means of defence affords a constant temptation to more aggressive neighbours looking out for fresh lands to conquer. But it is a definite historical as well as biological fact that he who conquers does not necessarily hold what he has conquered. The long annals of the Chinese nation are full of instances of invaders who swooped down upon the fair plains of the Flowery Land only to be absorbed and deprived of their identity through the genius of the Chinese people.

The law of survival of the fittest has operated effectively in the movements of peoples throughout the ages. Communities living on poor steppes or plateaus have ever been envious of those of their neighbours enjoying the fruits of Nature in regions "flowing with milk and honey." It may be considered a general rule that agricultural peoples dislike war and are ill-prepared to meet it when it comes. The more prosperous they are the less anxious and capable they are to equip themselves to defend their patrimony. These peoples (like the Chinese) are liable to be attacked by neighbouring brigands who sometimes retire to their less attractive homes with their booty, but who often remain among the conquered; in such cases, they become assimilated and more and more civilized until they in turn are subject to invasions from their barbarian kinsmen.

It must not be thought that hunger and spoils are the only impulses towards migration. Take the example of the United States of America. Although the discovery of gold in the Western states a hundred years ago served as an irresistible motive for the rush of immigrants from the Eastern states, the desire for land and riches could only be considered a partial explanation for the westward colonization of the United States. We must take into account the operation of sentiment and the dislike all pioneers feel for any restraint whatsoever to their freedom of thought and action. The Boers in South Africa afford a parallel instance. Many examples from history may be cited to prove that large scale migrations are often the result of social, religious or political intolerance. The exodus of the Hebrews from Egypt, the landing of the "Pilgrim Fathers" from the "Mayflower" in New England, the migration of the French and Flemish Protestants into England, may be noted. Sometimes, as in the case of the fanatical followers of Mohammed who overran a large part of Europe and the Near East slaying those who refused to embrace the faith of Islam, religious enthusiasm has been responsible for shiftings of population. The histories of Buddhism and Christianity also reveal instances of the influence of religion upon race expansion and the consequent migrations of peoples.

Spectacular though these more or less violent human migrations are in the history of this planet, they are often of less import than the quiet, steady drift of peoples from one region to another, as, for example, the emigration of Europeans to America and the peaceful penetration of the South Seas by Chinese settlers in modern times. These subjects will now be dealt with.

(b) *Emigration to the United States*

The great geographical discoveries that marked the 15th to the 17th centuries gave a fresh impetus to large scale emigration from Europe to new lands across the Atlantic Ocean. Vast continents with unlimited natural resources were thrown open to adventurers and pioneers in search of gold and new homes. Trading posts and, later, settlements, were established in the New World. Portugal and Spain were the first Europeans on the field, these two great empires of the past having occupied parts of South and Central America as early as the 16th century. By the early years of the 17th century the English had already begun to colonize many tropical and semi-tropical countries. France sent emigrants to Canada at about the same time. By 1760 when the British captured Quebec, the French population of Canada had reached 70,000, as compared with 2,500 in 1664.

What may be described as the most remarkable peaceful mass movement of peoples in history, both in regard to volume and variety, has been the populating of the vast territory known as the United States of America by immigrants from Europe. And the change has taken place within the short space of one hundred years. This progressive filling up of the wide open spaces of a new world forms without doubt one of the most epoch-making pages in the history of the 19th century.

To show the remarkable movements of peoples from one continent to another, the following figures may be quoted:—The present population of the United States is over 125,000,000. In 1790 it was only 4,000,000. The number of immigrants previous to 1820 averaged 5,000 to 6,000 annually. Between 1820 and 1927, 37 millions entered the country of whom 32 millions came direct from Europe. Up to 1846 (that is, during the first 70 years since the independence of the United States) only 1,600,000 immigrants entered the country. In 1847 began an enormous influx from Ireland which was then affected by a great potato famine. The political trouble in Germany in 1849 resulted in a big exodus from that country into the New World. Between 1847 and 1854 the rate of increase of immigrants was from 250,000 to 400,000 per annum. The decade following 1847

witnessed an influx of three million immigrants (double the number for the previous 70 years!).

The steady filling up of the vast sub-continent of North America was at first welcomed. Up to 1880 most of the immigrants came from Northern and Western Europe; following that period Southern and Eastern Europeans swamped the shores of the United States. As an example, the decade 1871-80 recorded only 200,000 from Eastern and Southern Europe, whereas in 1901-10 the latter countries sent 6 millions (over 70 per cent of the total immigrants). Between 1911 and 1915, of 3,796,000 immigrants 3,000,000 or 80 per cent came from Southern and Eastern Europe. Up to 1917 no restrictions had been placed upon the entry of white races except certain types, such as paupers, diseased persons, etc. The U.S. Government then became alarmed at the rapid influx of a poorer type of settlers, and two Immigration Acts were successively passed in 1921 and 1924, imposing quotas upon all countries sending emigrants into the country.

The earlier Act limited "the number of aliens of any nationality who may be admitted under the immigration laws to the United States in any fiscal year to 3 per cent of the number of foreign-born persons of such nationality resident in the U.S. as determined by the U.S. census of 1910." By this restriction, the total annual immigration was fixed at 357,803 (that is, one-third of the number of European immigrants in 1913-14.) The Act was also selective in character as it automatically limited the influx of aliens from Southern and Eastern Europe. One defect in the law was that no restrictions were placed on immigration from Canada and Mexico—resulting in partial defeat of the aims of the sponsors of the Act.

The Immigration Act of 1924 assigns a temporary maximum limit of 160,000 per annum to the number of immigrants from Europe, later to be reduced to 150,000. Immigrants from non-quota countries are not included in this total. Each country's quota is limited to 2 per cent of the number of foreign-born individuals of that country resident in the United States as shown by the 1890 census. The result of this law is that the total immigration from southern and eastern Europe is reduced to less than one-fifth of that from northern and western Europe (15 per cent against 84 per cent). Japanese are excluded under one of the provisions of this law. The purpose of this legislation is to reduce the number of immigrants so as to afford an opportunity for assimilation, as well as to preserve as far as possible the dominant racial characteristics of the majority of the people of the United States.

The defects of the law are obvious. Unskilled labour becomes increasingly scarce, as hitherto new immigrants supplied this demand. Undesirable aliens are being drawn from Mexico as well as from Canada, from which countries much illegal activity has sprung. The remedy lies in the extension of the quota arrangement to all countries on the American continent, in addition to an aliens registration enactment to check illegal immigration.

(c) *Migrations within the British Empire*

The British people have for some centuries been in the habit of leaving their own shores, in greater or less numbers, for other parts of the world. British colonies were established early in the 17th century in Virginia, Massachusetts, Bermuda and Barbadoes. Emigration proceeded steadily until 1820; but between that year and 1914 over 16 million people left the British Isles to settle in other countries. Economic conditions played a vital role in this great movement of population. For instance, the Irish potato famine (as mentioned earlier) and the discoveries of gold in Australia and California gave rise to an average annual outflow of over 280,000 during the years 1846-54. The agrarian troubles of 1880-90 also resulted in large outward movements from Great Britain.

The United States absorbed the greater proportion of this emigration. During the years 1815 to 1906, 65 per cent of all British emigrants went to the United States, 15 per cent to Canada, 11 per cent to Australia and 7 per cent to other parts of the British Empire. After the latter date, partly due to the U.S. Immigration laws and partly on account of schemes for settling Britishers in the British dominions, the proportions became reversed; for instance, the Empire absorbed 62 per cent of British emigrants in 1910, 70 per cent in 1912, 75 per cent in 1919 and 79 per cent in 1920-27. An average of over 200,000 per annum migrated from Britain between 1920-27.

The British dominions like Canada and Australia, being sparsely settled, desire the admission of British emigrants from the Home Country who are willing to work on the land. But on account of the highly industrialized nature of the British system, more skilled industrial workers are available for overseas settlement than agricultural labourers. Hence, but for the financial aid extended by the British Government to would-be emigrants to other parts of the Empire, backed by the quota restrictions of the United States Government, the filling up of the vast spaces of Canada and Australia by settlers of British origin would have been even more of a failure than it is under present conditions. Australia especially

is still very sparsely settled except along the south-eastern fringe of the huge continent, and the Asiatic exclusion policy has not helped to clarify the situation. In Canada to which British industrial workers are reluctant to go, aliens are more and more usurping the dominant races (British and French Canadian). British settlers have not proved a success under the hard living conditions of the Canadian prairies, in a country where industry is still in its infancy and the natives are jealous of their standard of living.

(d) Land Migrations

Movements of peoples over land frontiers have existed since the beginning of history. Whereas migrations across the sea have been characterized by more or less permanent settlement of the migrants in the new lands of their adoption, continental migration has, in Europe at least, been of a seasonal and temporary nature.

France, for example, has recruited many of her labourers from contiguous countries such as Italy. The seasonal migration of Poles into Germany for agricultural work before the War, as a result of the industrial expansion of the country causing a dearth of native workers on the land during harvest time, may be cited as another case in point. Since the World War, 1918, the work of reconstruction in the war-torn countries of Europe has necessitated the employment of foreigners from other parts of Europe who have been denied admission into the U.S.A. on account of the quota law.

Much legislation has been enacted in the various countries of Europe as a consequence of this great influx of alien workers into such countries as France and Belgium. This influx has raised many social and economic problems, and questions of national security, hygiene, legal and social status of the immigrants, have to be met.

In the United States of America, the years since the War have seen a great movement of negroes from the agricultural South to the industrial North where higher wages and more attractive conditions of town life obtain. This movement was accentuated by the practical cessation of immigration from Europe during the War years and by the resultant demand for unskilled labour in the industrial cities of the North. There is a mathematical law which states that action and reaction are equal and opposite. Thus we see that one result of the scarcity of negro field workers in the Southern United States (following their migration northwards) is

the heavy influx (both legal and illegal) of Mexicans from the other side of the Rio Grande to make up for the shortage of labour.

In the case of Canada, the overseas influx has been nearly offset by the large scale emigration across the border into the United States. For example, in 1925-27 a total of 340,000 persons entered Canada, but during the same period over 280,000 Canadians crossed into the U.S.A.

It is necessary to emphasize again the one indispensable requirement if immigration of a people to a strange land is to be successful, namely, adaptability to the new conditions of climate and work. That is why even militarily powerful nations are often poor colonists; all their guns and all their resources cannot make their home-loving nationals settle under severe climatic and economic conditions, and compete successfully with racially more robust and adaptable, if militarily weaker, neighbours.

(e) International Regulations Governing Movements of Peoples

Early migrations of peoples were distinguished by comparative freedom from restrictions. The situation then was devoid of complexities. Inhabitants of sparsely populated regions welcomed immigrants who could assist in opening up further areas to cultivation and perform work for which they were most suited. There was plenty for everybody. So far as the white races were concerned, only persons regarded as undesirable (whether physically unfit or morally tainted or likely to become a burden to the community) were excluded. But since the War of 1914-18, other considerations came into play. The intense nationalism that was one of the major consequences of that disastrous struggle gave rise to legislation designed to shut out aliens from the so-called preserves of the existing populations.

A necessary corollary to this changed state of mind has been the stringency of the medical and civic tests to which the immigration countries have put intending immigrants. In addition to restriction in numbers, occupational tests are enforced and racial discrimination becomes the fashion. Thus we may say that three fundamental considerations form the basis of modern regulations governing the entry of aliens into countries that have hitherto welcomed foreign additions to their existing population: economic (to safeguard standards of living), political (to prevent violent or insidious attempts to alter the existing forms of government), and thirdly, racial, as when a country wishes to limit the numbers of certain stocks or to keep the existing stock pure and undisturbed in the enjoyment of the fruits of the land. Often all these motives

are inextricably mixed, one or other being brought forth as a justification for more than usually strict exclusion laws as circumstances demand. Thus, the exclusion of Chinese from California, being a settled policy of the United States authorities, has been attributed by its apologists to the influence that Chinese lower standards of living might have on the economic status of the natives. But anyone who has observed the general attitude of the Americans in that region towards all Chinese except perhaps students and tourists (who go there to spend money) cannot avoid the reflection that racial prejudice plays a not inconsiderable part in the prevailing state of affairs. The situation in Canada is, if anything, worse; and Australia has been notorious in this respect.

It has to be borne in mind that the policy of restriction is adopted not only by immigration countries but also by those nations whose sons look beyond their native heath towards the "promised land." It is clear that if the United States, for example, looks askance at Italian immigrants who in their thousands threaten both the economic and social structure of the nation, Italy frowns with equal disapproval at the steady drain of her man power to the economic advantage of a foreign country. Some of the nations of Europe created by the Treaty of Versailles, such as Lithuania and Czechoslovakia, which formerly sent out large numbers of emigrants, consider unrestricted outflow a danger to their national strength, and have therefore adopted the necessary legislation. Other countries, like Italy, encourage their nationals abroad to remain true to their fatherland and remit their savings home. As a natural result of this reluctance to benefit other nations through the loss of their subjects, the emigration countries, especially those who are militarily powerful, are casting their eyes over little developed and weaker lands and demanding colonies which they would exploit as fresh markets for their national products and as sources of raw materials.

Let us examine into the case of Italy in more detail. The Italians are a prolific race, and since Mussolini came into power great encouragement has been extended to families to increase the number of offspring. The annual increase of population amounts to over 500,000. Before the quota laws came into force in the United States, some 200,000 Italians were admitted annually, but this avenue has now been closed. France for a time after the War took in large numbers to assist in the restoration of the devastated areas, but recent restrictions imposed upon immigrants have forced Italy to look to other countries for an outlet for her surplus population. Her sons are not always welcome, in spite of greater pains to select a better type of emigrant. The present government has as

a result altered its policy in so far as to conserve the nation's military power, and to send out only those emigrants who can help to colonize territories won by force of arms or secured by peaceful arrangement.

Conflicts are inevitable when immigration and emigration countries do not see eye to eye. National policies differ: immigration countries naturally desire that aliens admitted should be as rapidly assimilated as possible, while the reverse is true with reference to the immigrants' countries of origin which encourage their nationals to retain their old loyalty. A compromise that has worked out with some success is in the case of oversea Chinese in Malaya. While living peaceably and obeying the laws of the country of their adoption, these Chinese nevertheless are keenly interested in the fortunes of their fatherland and have, on numerous occasions shown, by financial and other support, their practical sympathy with the country of their ancestors. Many of them are of the third or fourth generation of settlers in Malaya, have never visited China and are British subjects by birth.

These political and economic maladjustments have affected considerably the numbers of emigrants leaving the respective countries in recent years. The restrictions on the movements of population are further accentuated by the greatly increased cost of transportation which has led several governments to institute state-aided migrations. We have mentioned the financial help extended to intending settlers in the Dominions by the British Government. Both Italy and Japan have also been active in this direction, the latter spending vast sums of money in a vain effort to colonize successfully the Northeastern Provinces of China now under military occupation.

As early as 1855 the Australian government had made it a fundamental point in their colonization policy to exclude Asiatics, although the passage of years and the peculiar climatic and economic conditions of the Australian Commonwealth have shown the futility of attempting to settle Europeans on land that could only be properly developed by races inured to hardships and extraordinary rigors of climate. In the United States, Chinese are excluded under the Chinese Exclusion Act of 1882, while Japanese came under the "Gentleman's Agreement" of 1907, a purely voluntary understanding whereby Japan undertook to adopt measures to check immigration into the U.S.A. The Immigration Act of 1924, however, definitely excluded Japanese immigration under the provision that aliens ineligible to become U.S. citizens are not admitted except in accordance with existing treaty stipulations.

Other countries, like Canada, South Africa and New Zealand, have also at various times passed legislation aiming at the exclusion of Asiatics. In the next section we shall see how Chinese emigrants are affected by this practically world-wide movement.

The International Labour Office was established in 1920 by the Treaty of Versailles which ended the Great War. One of its main functions is to coordinate the arrangements whereby countries with a deficient labour force might recruit the necessary personnel from those with an abundant supply, so that causes of friction may be eliminated in organizing movements of population. The object is to secure equality of economic treatment in any country for all workers legally resident therein. Successive International Labour Conferences provide for reciprocity of treatment as between national and foreign workers, coordination of legislation relating to migration, labour exchanges, elimination of unscrupulous agents, exchange of statistical information, protection of emigrant girls, simplification of inspection of emigrants on board ship, etc.

The rival claims of emigrant and immigrant countries are bound to grow more acute as national consciousness, racial pride and economic jealousy increase in intensity. On one hand, we have a large country possessing a small population, an object of envy to a rapidly growing nation with insufficient natural resources and a surplus population; on the other, there is the very natural desire and right of every country to protect its standards of living against disruptive forces from outside, and to preserve as far as possible its people from unwelcome racial contamination.

3. EMIGRATION OF CHINESE BEFORE 1930

(a) *General Survey of the History and Scope of Chinese Emigration*

Chinese records show that the original inhabitants of ancient times were nomads who roamed and hunted along the upper valley of the Yellow River in what are now the provinces of Shansi, Shensi, Kansu and Honan. Periodical encroachments of the Hsiung-nu, those ancestors of the Huns who later overran most of Europe, forced the early settlers to move from place to place, ever in a southward and eastward direction. Some crossed the Yangtze River and made their homes in what are now Kwangtung and Fukien provinces, intermingling with the indigenous tribes whom they encountered. Aborigines belonging to these tribes, such as the chung-chia, miao, miao-tzu, miao-chia, kachins, keh-lao, loi, lolo, yao, moso and manchia, are still to be found in the mountainous districts of Szechuen, Hunan, Kweichow, Yunnan, Kwangtung and Kwangsi. A certain proportion of settlers from the North, now to be found in

many parts of Fukien, Kiangsi and the Liangkwang provinces, have never entirely intermingled with the people among whom they have lived for centuries; they speak a dialect akin to mandarin, and make very good emigrants, being hardy and capable of great endurance in strange places. They are known as the *hakka* (guest people).

The Chinese have for centuries been adventurers. Singly and in groups they have braved the unknown terrors of desert, mountain and ocean, in search of new lands and fresh knowledge. From the days of Meng Chiang, in the Eastern Chou dynasty (500 B.C.), who engaged in a fruitless search for her husband across thousands of miles of desert wastes, to the present era which witnesses an annual exodus of more than a hundred thousand emigrants bound for the South Seas, the sons of Han have looked beyond their native shores across "the four seas" for new lands to conquer. There is the story of Hsu Shih, a Taoist monk who was ordered by the Emperor Chin Shih Huang-ti, builder of the Great Wall, in B.C. 221, to go to the fairy isles beyond the Eastern Sea and bring back the plant of immortality. Hsu Shih took with him 3,000 youths and 3,000 maidens and set forth in large sailing vessels towards the eastern horizon. The whole party was never heard of again. Chinese believe that the adventurers reached the islands of Japan, settled there and became the ancestors of many of the present-day Japanese.

Then there is Chang Ch'ien who was sent on a mission to Ferghana, Bactria and Western Asia by his master, the Han Emperor Wu Ti in 128 B.C. This was the prelude to the discovery of the north-western route to India and the countries to the west of China, and resulted in further additions to the great empire of the Hans. The fourth century after Christ saw the epoch-making travels of Fa Hsien who walked across Central China, over the desert of Gobi and the Hindukush Mountains to India, from where he took ship back to his native country, visiting Ceylon, Java and the southern islands.

The travels of noted Chinese explorers of the past did much to prepare the ground for the settlement of Chinese emigrants in other lands in later years. Men like Hsuan Chuang, Wang Hsuan-ts'e, I Ching, Wu Kung, Chiu Ch'ang Ch'un, Cheng Ho, and the great Mongol rulers Jenghis and Kublai Khan (Shih Tsu), endured hardships to extend the dominions of China or exchange culture for culture.

The early emigrants to North and South America, in the last days of the Manchu dynasty, were actuated purely by economic motives. Among those who emigrated to the South Seas, on the other hand,

were many who were forced to leave their native land on account of political differences. The barbarian invasions which preceded the fall of the Sung dynasty were responsible for a large exodus of patriotic Chinese who were reluctant to live under alien rule. These adventurers took refuge in Indo-China, Cambodia and Siam. In later years, when the Manchus conquered the country, many Chinese soldiers and citizens including those under Kwei Wong, who was defeated in Burma, settled down both in the latter country and in Siam. At the same time, Koxinga (Cheng Ch'in-kung), who was unsuccessful in his revolution in Formosa, formed a nucleus of further emigration of Chinese to Formosa and the Philippines. The misgovernment of the Manchus during the last years before the Revolution, combined with the economic depression, made Chinese again turn their eyes to lands beyond the seas. In spite of ups and downs, the outward movement which thus began is still with us today.

Large scale overseas migrations may be grouped under three periods—those of the 7th, 15th, and 19th centuries. Chinese colonists settled in the Pescadores (Pheng-hu Archipelago) and Formosa (Taiwan) in the 7th century. They were derived mainly from the coastal cities of Ningpo, Foochow, Chuanchow, Amoy, Swatow, Canton and Hoihow (Hainan). The foundations of Chinese culture in Formosa were laid by the Hakkas who began to trade with the inhabitants of that island. Trade routes were established by these early settlers and their home folks with the South Seas, notably with Malaya, the Philippines and the Netherlands Indies, paving the way some centuries later for the second mass overseas movement of the Chinese.

The 15th century witnessed a rush for the rich lands south of the Chinese Empire, glowing accounts of which had been brought back by such travellers as Cheng Ho. A huge junk traffic was brought into being, and adventurous souls from Kwangtung and Fukien set forth in these frail craft during the Ming dynasty for southern Asia and the islands of the Malayan archipelago.

The tide of colonial expansion of the European powers in the 19th century swept along with it a swift undercurrent of Chinese emigration. Labourers for the development of their Asiatic colonies and possessions were urgently required by Spain, Portugal, Great Britain and Holland. China was then, as she is now, an inexhaustible source of manual labour. Therefore, a profitable trade in contract labour came into existence about 1860, which later suffered from serious abuses due to the cupidity of the employers and their underlings, and the ignorance and defenceless state of

the emigrants who in most cases had to shift for themselves, without help from a weak government at home. The old type of emigrants who left their native shores willingly and independently, full of the spirit of adventure, gave way to a system of indentured labour whereby the poor "sucklings" were packed in droves for export to work in the mines and plantations of the European colonies. Certain countries, like Hawaii, South Africa and war-time France, arranged for temporary Chinese labour which had to work under stringent socio-economic conditions.

In estimating the total number of Chinese residing abroad at the present time, it is necessary to remember that very large numbers belong to the second, third or even fourth generation of settlers. In the statistics usually given of the number of overseas Chinese, only citizens of China are referred to. Thus, Table I does not take into account the several millions of Chinese in Formosa, Malaya, the Netherlands East Indies and elsewhere who claim Japanese, British, Dutch or other nationality.

TABLE I

Siam	...	2,500,000
British Malaya	...	1,709,392
Netherlands Indies	...	1,232,650
Indo-China	...	381,417
Burma	...	300,000
Soviet Russia	...	251,500
Macao	...	119,857
Philippine Islands	...	110,500
British Borneo	...	75,000
United States of America	...	74,954
Formosa	...	46,691
Canada	...	42,100
Korea	...	41,303
West Indies	...	36,400
Hawaiian Islands	...	27,000
Mexico	...	24,000
Japan	...	20,074
France	...	17,000
Australia	...	15,500
Central America	...	9,400
Great Britain	...	8,000
Holland	...	8,000
Turkey	...	7,000
Peru	...	5,704
Other Countries	...	836,154
Total about		7,900,000

(b) *Causes of Chinese Emigration*

The motives that have driven Chinese to emigrate to foreign countries have been intricate and diverse. The special circum-

stances under which whole families from various districts, particularly in South China, left their native shores for distant lands will be described in a later section. It is proposed here to deal briefly with the general causes of the periodical mass exodus of unskilled labour from this country.

We have discussed the relation of population to emigration. There is no doubt that the pressure of population forms one of the fundamental driving forces in the migration of peoples. In spite of the vastness of the country and the wealth of raw materials, the absence until recently of coordinated efforts to make the nation self-supporting as far as food is concerned has encouraged the departure of large numbers of Chinese who, faced with possible starvation at home, risk unimagined dangers to seek food and security abroad. Natural disasters, such as floods, droughts, etc., wreak havoc with the crops, while disease and banditry add their toll to the insecurity of the population. The tendency for the masses to concentrate along the basins of the three great rivers, leaving vast tracts of land sparsely settled or even unpopulated, has also produced a congestion that even the large scale emigration of the past century has failed entirely to overcome.

It must not be forgotten, however, that wars and famines have during the past century acted as brakes on any tendency towards a normal growth of population. Thus, although there was a progressive increase from 1749 to 1842, the next 70 years saw a serious fall in the population of the whole country, particularly noticeable in the provinces of Anhwei, Chekiang, Chihli, Kansu and Kiangsu. The estimated population of China from 1749 onwards is shown in Table II.

TABLE II

1749:	175 millions	.....	(Ta Tsing Hui Tien)
1760:	198 millions	.....	do.
1780:	276 millions	.....	do.
1812:	339 millions	.....	do.
1842:	391 millions	.....	(Ministry of Revenue estimate)
1882:	313 millions	.....	do.
1885:	306 millions	.....	do.
1910:	308 millions	.....	(Mingchengpu estimate)
1920:	375 millions	.....	(Chinese Post Office estimate)
1936:	476 millions*	.....	(Ministry of Interior census)

The drop of 80 millions in the population between 1842 and 1882 may be partly accounted for by the Taiping Rebellion (1854-64) when it was estimated 20 millions were killed or died as a

*This figure is probably correct, in which case the 1920 Post Office estimate may be considered too low.

direct result of the civil war, and by the famines of 1846, 1849 and 1877-78, when a total of 23 millions lost their lives.

There is no question, however, that in spite of great losses through natural disasters, civil wars and preventable diseases, the available arable land of the country has been insufficient to support the four hundred millions, about 80 per cent of whom are farmers who depend entirely upon the soil for their sustenance.

The severe droughts and famines that have afflicted the four provinces from which most of the emigrants have been derived, namely, Kwangtung, Fukien, Shantung and Chihli (Hopei) have contributed appreciably to the exodus of population since the 14th century. It is understandable that the young and more adventurous among the natives of these provinces should leave their poverty-stricken homes to seek a better livelihood abroad. This movement is parallel to the large-scale migration of poor Europeans during the 18th and 19th centuries to the rich and promising lands of the New World.

Another factor governing Chinese emigration from the four provinces mentioned above is their easy accessibility to the sea. They all possess good ports from which the inhabitants living in the surrounding districts could embark. Thus Kwangtung possesses Swatow, Canton, Hoihow (Hainan) and Hongkong; Fukien has Amoy and Foochow; Shantung has Weihaiwei, Tsingtao and Chefoo; and Chihli (Hopei) has Tientsin and Chinwangtao.

The adventurousness of the Chinese is another important reason for the wide-scale emigration that has taken place in modern times. The emigrants have generally been men of great energy, robust and healthy, who welcomed change of life and environment. Their vitality and adaptability to strange environmental forces are exemplified by the success of their several callings and the strength of character of their descendants today who form one of the greatest assets of Republican China. Their business acumen and their ability to thrive in all climates, subsisting on very little, make them successful colonizers.

The standard of living of the farmers at home is at all times very low. It is estimated that the average family earns only about \$40 per annum—the yield from its holding of five mou.* The wages the emigrants can secure abroad are much higher by comparison for similar occupations. The stirring tales told of fortunes made overseas, and the millions of dollars that are sent back annually to the home country (forming a large proportion of the invisible imports) act as incentives to further emigration.

* One mou=one-sixth of an English acre.

(c) Methods of Emigration

Until the introduction of steamships, Chinese emigrants braved the terrors of the ocean in junks which looked hopelessly inadequate for their task of conveying large numbers of adventurers to distant lands. Yet these crafts have proved remarkably seaworthy and the skill and fortitude of the old navigators illuminate one of the most glorious pages in the history of the sea. Smaller junks were used, as they are still, for the river and coastal trade, while the larger ones were adapted to carry passengers or cargo (rice, tea, fish, fruit, etc.). An ocean-going junk usually measures from 75 to 110 feet (English) long with a beam of 17 to 35 feet and a draught of 6 to 12 feet, and has a displacement of anything from 350 to 750 tons.

As the tide of emigration began to reach serious proportions it was found necessary to systematize the collection of intending emigrants from the supplying districts contiguous to the ports, to look after them while waiting for their steamers, provide for their board and lodging, in many cases advance their passage fares, etc. Emigration companies therefore sprang into existence, and brokers and agents were stationed in the different emigration ports who acted as liaison between the shipping companies which supplied the transportation, the lodging house keepers, the prospective emigrants and the quarantine officials who had to examine them.

It has been the custom when Chinese labour is needed in a foreign country for that country to send a labour contractor, representing the Government or an important firm, to sign a contract with the broker on the Chinese side, stating the terms, namely, number of persons required, conditions of employment and length of service. Of late, medical examination of emigrants at the ports of embarkation has been made very strict in order to obviate the necessity of shipping companies having to repatriate those who may be rejected by port health authorities at the immigration centres. This aspect of the problem will be more fully dealt with when we come to the work of the National Quarantine Service in Amoy and Swatow.

Various factors, such as tradition, attractions of climate, kinship between new emigrants and those who have already settled abroad, determine the places for which prospective colonizers are bound. For example, Cantonese like to go to Malaya, the Netherlands East Indies and America; Fukienese gravitate to Formosa, the Philippine Islands, Borneo and the Sulu Archipelago; while labourers for the Transvaal (South Africa) and for France during the War were recruited from Shantung, Hopei, and the Northeastern Provinces.

(d) Relations between China and the Receiving Countries

In spite of the adventurousness of those Chinese who left their native soil for strange countries, the great majority of the people are generally satisfied with their life at home. They love their fields and their families. Traditions bind them to the soil on which they subsist, and but for overwhelming causes, they do not even care to travel far from their own native province or district. Yuan Ti of the Han dynasty once said: "It is an instinct in our subjects to be content with the soil and be cautious of migrations." The general dislike for travel may be summarized in the common saying: "To be away one li from the home is not so good as home." Emigrants in the old days were looked upon with suspicion, and were often debarred by edict from returning home.

China's traditional policy of isolation received a severe setback in the 19th century when the foreign powers found her weak and unable to defend herself from aggression. Europe was then at the height of her power and prosperity. Many of the nations, such as Britain, Holland and France wanted manual labour to help develop their colonial possessions, and China appeared the most likely field of recruitment. The result was that she was induced by peaceful means or otherwise to accede to a scheme of large-scale employment of emigrant labour in the tropical and semi-tropical dependencies of the Powers.

Indentured labour first became legalized in 1859 when the governor of Kwangtung permitted France and Britain to recruit Cantonese labourers from various districts in the province. In 1860 a treaty between China and Britain made the practice legal throughout the country. Article 5 states:

As soon as the ratification of the treaty of 1858 shall have been exchanged, His Majesty the Emperor of China will, by decree, command the high authorities of every Province to proclaim throughout their jurisdictions, that Chinese choosing to take service in the British colonies or other parts beyond the sea, are at perfect liberty to enter engagements with British subjects for that purpose, and to ship themselves and their families on board any British vessel at any of the open ports of China. Also that the high authorities aforesaid, shall, in concert with Her Britannic Majesty's representatives in China, frame such regulations for the protection of Chinese emigrants as above, as the circumstances of different open ports demand.

In 1866 a convention was signed between China, France and Britain which specified the place of destination and length of employment; free passage for the emigrant and family (if any) to and from the port of embarkation; working hours per day and working days in the year; wages, food, lodging and medical attendance; monthly remittance to the family at home at the desire of the emigrant. The Chinese government insisted in this convention

on the following points:—(1) That while the Government threw no obstacle in the way of free emigration, that is to say, to the departure of Chinese subjects leaving of their own free will and at their own expense to foreign countries, all attempts to force Chinese to emigrate under conditions not provided for in the regulations would be severely dealt with; (2) That Chinese could not be kidnapped or tricked into agreeing to leave their country, the death penalty to be carried out on violators; (3) That whereas the operations of the emigration agents, with a view to supplying coolie labour abroad, were authorized at all the open ports when conducted in conformity with regulations, and under the joint supervision of the consuls and the Chinese authorities, such operations were entirely forbidden where such joint supervision could not be exercised.

The British and French governments refused to ratify this convention on the grounds that Chinese emigration could, from its provisions, only be carried out under government supervision, and that the death penalty for illegal and unauthorized emigration was too severe. In spite of this opposition, however, the government at Peking proclaimed the convention of March 1, 1866 the law of the land.

Emigrants who returned home before this date were severely punished, with the result that oversea Chinese remained in the lands of their adoption and were permanently lost to the country. The folly of this policy was realized by Chinese statesmen who urged the cancellation of the old emigration laws. Hsueh Fu-ching, then Chinese Envoy to Great Britain, memorialized the Throne in these words:

To drive fish into others' nets, or birds into others' snares (says Mencius), is not clever policy, but it is what we have been doing for England, Holland and other countries. These get Chinese labour and great towns spring into being on desert islands. Foreign countries thus make us into instruments for their aggrandizement. We the while drive away Chinese skill and the profits of it into their arms.

As a result of diplomatic representations, the edict of 1712 which forbade emigrants to return home, under the extreme penalty, was rescinded by the edict of September 13, 1893 whereby Chinese in foreign countries were permitted to return to their fatherland whenever they wished.

The welfare of returning emigrants had long exercised the minds of philanthropists, and the Governor of Fukien succeeded in gaining the consent of the Emperor for the establishment of a chamber of commerce in 1899. The tide turned and the home government became more and more benevolent in its attitude

towards its overseas brethren. Thus an Imperial edict of October 12, 1899 reads:

Since the opening of the treaty ports many of our subjects have been drawn into foreign countries to engage in trade. In the foreign land they retain, however, with unshakable loyalty, their memory of the fatherland. They cannot treasure their native country too highly and this is most commendable. In a former message, we requested the governors of the provinces to take all returning emigrants under their special protection so that they might enjoy in peace in their homes the money earned in the foreign countries. In our anxiety for the welfare of our subjects, and especially those sojourning abroad, we, herewith, command our ambassadors and consuls as far as lies in their power, to extend help and protection to the Chinese in their districts.

As an example of the opportunist policy of certain countries in their relations with China, we may cite the attitude of the Transvaal (South Africa) in 1904-10 when labour was urgently needed for the Witwatersrand gold mines, and since then when Chinese have been prohibited from residing in and about the mining districts. (Even former residents may only remain for five more years). The Transvaal government in 1904 induced the British government to sign a convention with China respecting the employment of Chinese labour in British colonies and protectorates. In addition to definite stipulations regarding conditions of work, (wages, food, lodging and medical care), term of engagement, free passage to and from port of embarkation, the convention provided for the appointment of Chinese consuls and vice-consuls by the Emperor of China to look after the interests of the workers and other Chinese residents. Chinwangtao was selected as the port of embarkation for the labourers who came mostly from Hopei and Shantung. The Transvaal Chamber of Mines built a hospital there for the use of the emigrants. An average of 3,000 patients were seen during the years 1904 to 1910 when the last batch of workers returned from South Africa.

The War of 1914-18 saw a great shortage of labour in France. The Chinese Emigration Bureau promulgated a set of regulations governing the employment of Chinese labourers by the British and French governments. Although, before China joined the war on the side of the Allies, it was stipulated that no Chinese labourer was to be engaged in military operations of any sort, after August 14, 1917 when China declared war on Germany, both the British and French armies employed Chinese workers in the war zones in addition to other spheres in connection with the war.

The Chinese Emigration Bureau was set up by the Chinese government to protect emigrants from exploitation. Some of its laws provide for the limitation of emigration to those selected and

sent abroad by the government, those directly recruited by agencies and those recruited by contractors. Licences and permits are required by both contractors and agents of foreign governments before emigrant labourers can be recruited. The aim of the Chinese government is to prevent the ruthless exploitation of Chinese labour by private companies. Instances are on record where ignorant country folk have been sold like "little pigs" for manual labour in countries far away from their homes.

This Emigration Bureau which was established in the seventh year of the Republic (1918) gave way the following year to the Bureau for Overseas Chinese Affairs, headed by a superintendent and a vice-superintendent. The Bureau, however, soon closed down through lack of funds. In 1923 when Dr. Sun Yat-sen established his general headquarters in Canton, attention was again concentrated on overseas Chinese affairs. In 1927 when Nanking became the national capital, the movement to create a special commission to look after the interests of Chinese abroad, was mooted. It was not until 1932 that the Overseas Chinese Affairs Commission was founded and put under the direct control of the Executive Yuan. The three points, Emigration, Protection and Education, form the chief guiding principles of the Commission's policy. In spite of serious external and internal crises, the National Government's solicitude for its overseas brethren is still maintained. The authorities recognize the loyalty and patriotism of Chinese subjects living abroad who have, as we have had occasion to mention earlier, never failed to show their practical sympathy for their mother country.

The United States Congress in 1862 passed an act prohibiting the "coolie trade by American citizens in American vessels." This however did not prevent those who could secure consular permits at the port of departure from travelling in U.S. ships to America. The United States policy regarding immigration (including Asiatic immigration) has already been set forth earlier in this article. Suffice it to mention here that the Emigration Treaty of 1894 absolutely prohibited the entry of Chinese labourers into the U.S.A., except under specific conditions detailed in that treaty.

Emigration to the Netherlands East Indies reached large proportions during the past two centuries but there does not appear to be any treaty or convention between the emigration and immigration countries regulating this trade. Although many oversea Chinese in the Netherlands colonies have grown prosperous, their status has not been entirely satisfactory, and serious disturbances have marred this page in the history of Chinese

emigration, as we shall show when dealing with the conditions of life and work of Chinese abroad.

4. HOME ENVIRONMENT OF CHINESE EMIGRANTS

In a survey of Chinese emigration it is perhaps profitable to make a study of the environment from which the emigrants are derived. What is there in the topography of the land, the manners and customs of the inhabitants, their racial characteristics, the economic and political interplay of forces, that has urged Chinese from these regions to leave for strange shores? We have already discussed many of these factors, and it is proposed here merely to give some account of the characteristics of the various districts which form the native places of the thousands of emigrants who yearly congregate at the ports of embarkation.

(a) *Fukien Province*

Fukien, the home province of millions of oversea Chinese who now populate the South Sea countries (Malaya, Java, Borneo, Philippines, etc.), is one of the smaller provinces of China with a population that has steadily diminished during the last fifty years, until at the present day there are not more than 10 millions. It is bounded on the northeast by the watershed of the Min River beyond which is Chekiang Province; on the southeast by a broken and rocky coastline and the Formosan Channel beyond; on the northwest by a range of mountains which separate it from Kiangsi Province; and on the southwest by the Province of Kwangtung. The whole country is mountainous, the land rising from east to west. The Min is the only large river (350 miles long); situated 100 miles from its mouth is the city of Yenping, while the provincial capital, Foochow, lies 9 miles above Pagoda Anchorage which is 35 miles below the mouth of the river. Off the Chang River in the south of the province is the island and city of Amoy, one of the most important emigration centres in China. The sea outside Foochow and Amoy harbours is very rough on account of the division of the tidal wave by the island of Formosa.

The climate of the province is semi-tropical except in the western part which sometimes experiences fairly severe winters. Although the province is by no means as rich as many other parts of the country, and has in recent years been ravaged by roving bands of bandits, there are great possibilities. The principal products are camphor, black and green tea, tobacco, sugar, oranges, wheat and ginger, while coal, iron, galena, zinc, kaolin, gold, copper and lead are mined. Unfortunately the staple food of the country, rice,

cannot be grown successfully on account of the hilly nature of the ground, and large quantities have to be imported annually from Formosa, Siam and Indo-China. Timber is an important product of the interior of the province.

The Fukien *T'ung Chih* gives interesting accounts of the characteristics of the inhabitants of the various districts of this province. The following is a digest of certain passages in this old work referring to the source material of Fukien emigration:

Chang-chow.—The men are stubborn and courageous. They may appear unruly but are in reality very law-abiding. Many wealthy people emigrate, on the other hand the poor try to borrow money with which to leave their homes and seek their fortunes in foreign lands.

Chuanchow.—The people are very law-abiding. Those who live near the sea are good fishermen; seafoods are to be had in plenty but homegrown rice is scarce.

Chiennien.—This is a mountainous district not suitable for agriculture. The country people are quarrelsome but are brave and honest, while the city dwellers are frivolous and extravagant.

Foochow.—All available land is cultivated. The people are simple, thrifty and industrious, but are easily excitable and not very amenable to constituted authority.

Funing.—The people are honest and straightforward and respect old men. The rich do not encroach upon the poor, and the poor are contented. The scholars strive to be of service to their community. Those who become officials often resign their positions because their love for straightforwardness brings them disadvantages in political circles.

Hinghwa.—Bright young men study the classics or go abroad to achieve fame. The inhabitants are as a rule thrifty. Lack of proper communications in this mountainous district has given rise to the accusation that the people are unsociable. They prefer to believe in ghosts and charms when they get sick rather than in proper medical treatment.

Ting-chow.—Many of the people are farmers who are content to till their fields. There are few merchants, and few unmarried men and women.

Yenping.—The inhabitants are courageous, quickwitted and honest. Few leave home to be merchants. As a rule the people are thrifty and save for a rainy day.

Yungtsun.—Here the women are industrious and virtuous. Chastity and modesty are considered great virtues. Even girls of poor families do not marry twice; divorce is very rare.

(b) *Kwangtung Province*

Kwangtung is one of the most prosperous and populated provinces of China. It has an area of over 100,000 square miles and a population of 38,000,000. The South China Sea bounds it on the east and south, Kwangsi Province and Tonkin (Indo-China) on the west, and Hunan, Kiangsi and Fukien on the north.

The West River (Pearl River) is the main waterway of this province and shallow draft boats can navigate it almost up to the Kiangsi-Hunan border. Canton, the capital, is situated on the banks of this river and is less than 100 miles from Hongkong. Whampoa situated at the mouth of the Pearl River will soon become a very

important port when the harbour and railway development schemes are completed. The next largest port is Swatow, which lies on the east coast about five miles from the sea, on the fringe of a flat plain about 100 miles square in area. Next to Amoy, Swatow is the most important emigration port of South China. The island of Hainan is situated not far from the south coast, and has supplied thousands of emigrants for Malaya and the Netherlands East Indies.

The land is fertile and produces three crops annually. The climate is changeable, and moist and warm throughout most months of the year. The chief agricultural products are silk, tobacco, rice, vegetables, fruit, tea, sugar, groundnuts, hemp, indigo, cassia, camphor and sesamum. Many minerals are mined in the province, including coal, iron, antimony, zinc, graphite, quicksilver, silver, gold, lead, tin, and copper. Bamboo is also grown in large plantations and exported.

The Kwangtung *T'ung Chih* contains very useful descriptions of the people of the various districts of the province from whom are derived the emigrants who have helped to populate and develop so many of the countries of the earth. Some of the observations are very keen and are as true today as they were when they were first made.

Chaochow.—On the plain, farms and gardens are evenly divided. When the people do not till the soil they look after the gardens. Fishing and the salt industry flourish near the sea. There are many copper and bronzesmiths.

Ch'ungchow.—The district is unhealthy, being foggy and damp. The women are fond of finery and do not like to work. The people are very conservative.

Huichow.—The women go to market and the men stay at home. Quite a number of the inhabitants have gone abroad and become successful traders.

Kao-chow.—A fifth of the people are engaged in the pawnshop business. Living is very simple and cheap. Members of the Yao tribe inhabit the northern parts of the district and speak the Cantonese dialect. The Tungkias, who live to the northwest, on the other hand, have a different culture.

Kwangchow.—This is the metropolis of the province and does a very large trade with foreign countries. The people worship Buddha. Many people live in boats. Shunteh district is rich and fertile. Many eminent scholars come from here. The rich people are fond of luxury and have magnificent homes.

Lienchow.—The soil is not fertile. The Hakkas live in the city and are mostly merchants. The Tung-jen are farmers who live in villages and speak a dialect akin to the Amoy dialect. The Lis are mostly aboriginal peasants who live in outlying districts.

Looing.—The men till the soil and the women spin. Some are fishermen while others cut timber. The people are generally frugal and industrious.

Shaoching.—The inhabitants are easily excitable and have little self-control.

Shao-chow.—The men are stubborn but honest. It is a prosperous district and the farmers and foresters live comfortably on their earnings. The people are not so superstitious as those in other districts.

(c) Other Provinces

Shantung.—With an area of 56,000 square miles and a population of 32 millions, this province is one of the largest and most

populous in China Proper. Its boundaries are:—the Yellow Sea to the east; Honan and Kiangsu to the south; Hopei and Honan to the west; and Hopei and the Gulf of Pechihli to the north. The Kwenluen chain extends eastwards into Shantung, while the peninsula is rocky and mountainous. The Huang Ho waters a wide stretch of lowlying plain, 100 miles long and 50 miles wide, which forms the commercial and industrial centre of the province. This great river is only navigable for a few miles from the sea, and on account of its changing course and the frequent overflowing of its banks, has been responsible for untold suffering among the population. It is aptly named "China's Sorrow." The Grand Canal, the longest artificial waterway in the world, runs north and south and has been an important means of communication between Hang-chow and Peiping for centuries.

The soil is very fertile and the inhabitants are great farmers. The climate is temperate, but the winters are very cold with abundant snowfall. The principal products are cotton, cereals, silk, hemp, tobacco, groundnuts and fruit. Coal, iron, gold, lead and marble are the chief minerals.

The people are industrious, peace loving and usually more robust than the southerners. They do not like sea travel, and left to themselves, would prefer to migrate to Manchuria overland during certain seasons, returning to their native province to enjoy the fruits of their labours. They are hardy and capable of enduring extremes of climate. They made good labourers for the gold mines of the Transvaal and the war-torn fields of France. A few have managed to leave for foreign shores and are to be found in market places in the South Sea lands peddling their native silks and tiger skins.

Hopei.—This province is bounded on the north by Chahar and Jehol, on the west by Shansi, on the south by Honan and Shantung, and on the east by the Gulf of Pechihli. It has a population of 30 millions. The Pei Ho is the principal river; the great city of Tientsin is situated about 30 miles from the mouth.

The climate is very dry and cold in winter and hot in summer. Dust storms occur frequently. The plains are fertile, the important agricultural products being kaoliang, millet, wheat, maize, beans, groundnuts, cotton, hemp, fruit and vegetables. Coal is extensively mined in the Tongshan district, while other minerals found include gold, sandstone and kaolin. A vast trade in furs and hides passes through both this province and Shantung from their sources in Mongolia and the Northwest Provinces.

The inhabitants are robust, hardy, courteous, industrious and inherently honest. They are not so quickwitted or warlike as the Southerners, and are not fond of overseas travel or adventure. Peiping, the old capital, has long been the cultural centre of the nation. Very few Northerners are to be found among oversea Chinese, but with their Shantung brethren they have helped almost exclusively in developing and populating the Northeastern Provinces.

5. BRIEF SURVEY OF OVERSEA CHINESE

(a) *In Formosa*

The first authentic report on the island of Formosa (Taiwan) is contained in the Sung Annals:

As the island lies north of the Pescadores, it is sometimes called Pe-chiang (North Harbour), and also the "Land of Eastern Savages." It is not very far from Changchow and is a country full of high mountains and dangerous marshes. It is not governed by one ruler but is inhabited by 15 tribes. The people pay no taxes nor do they do any public labour. Those who have the largest number of children are considered the strongest and are obeyed by the others. Though they live on an island they are afraid of the sea and are not skilful in managing boats. They have no intercourse with neighbouring countries.

After the period of the Sui dynasty to which the above record referred, trade relations began to be developed between Formosa and the mainland of Fukien. Many fishermen from Amoy and Hinghwa settled in the Pescadores and in Formosa.

In the 18th century, migration took place from Chia-ying in Kwangtung province. One stream flowed westward to Kwangsi, and another eastward to Fukien and Formosa.

During the Ming dynasty, emigration was given a new stimulus as a result of the voyages of the eunuch Cheng Ho to the "Western Ocean" (1405-1430). Many of the poor people of the Fukien coast left for Formosa which they thought was a rich and promising land. Chinese and Japanese pirates who harassed the coast were also partly responsible for the movement to Formosa.

The 15th to 17th centuries were marked by the activities of European nations in Asia. As a result of the request of the Portuguese in 1511 for trading privileges in China, Macao was ceded to Portugal in 1557. Manila was taken by Spain in 1571, while in 1595 the Dutch succeeded in gaining a footing in Java. The Portuguese had previously made frequent use of Formosa in the course of their trading activities from Macao, but the Dutch, following their successes in the South Seas, determined to drive the Portuguese from Formosa. In a naval battle in 1622 the Dutch were defeated; they retreated to the Pescadores which they fortified.

In return for abandoning these islands which were uncomfortably near the Fukien coast, the Dutch were granted trading facilities in Formosa by the Chinese government. The 25,000 Chinese settlers, whose forefathers had emigrated from Fukien centuries ago, began to suffer from the encroachment of these Dutch traders who illegally levied taxes on rice and sugar grown on the island.

The approaching fall of the Ming dynasty gave rise to much confusion, and piracy was rampant on the China coast. The rise of the pirate patriot Koxinga (known in Formosa as Teh Kok-seng, and in Chinese records as Cheng Ch'in-kung) belonged to this period. Koxinga (as he was known by the Dutch) invaded Formosa in 1661 and defeated the Dutch in a series of battles and sieges. A treaty of peace was signed in 1662 by which the Dutch evacuated their forts established on the island. Koxinga's family ruled Formosa for three generations, after which the island was put under the jurisdiction of Fukien until 1886 when it was separately ruled by a governor appointed by the Manchu Emperor. In 1895, the island was ceded to Japan by the treaty of Shimonoseki which concluded the Sino-Japanese War.

There is no doubt that Koxinga laid the foundations of Chinese settlement of Formosa. The descendants of his soldiers who came mostly from Fukien are numbered among the 2,500,000 Chinese on the island today. These settlers are on the whole docile, law-abiding and hard-working farmers. They are very conservative and still stick to the traditions of centuries. Most of the staple industries of Formosa, such as camphor, tea and rice, were established by them. Of the present population of over four millions, three-fourths are Chinese or persons of Chinese descent.

(b) *In Malaya*

Malaya has been known by the Chinese since very early days. The Liang Annals, for example, contain references to *Tun-sun*, a land, 1,000 li* in extent, situated more than 3,000 li to the south of Fu-nan (Siam). In the *Hsin Ch'a Sheng Lan*, contained in Ts'ao Yung's collection of *Hsueh Hai Lei Pien*, Singapore is thus described:

This island is situated in the sea, opposite to the Straits of Dingga, high mountains facing each other on both sides. The ground is barren and not fit for agriculture; they always get their rice from the coast of Sumatra and other countries. The climate is variable. They make salt out of sea water and wine from the cocoanut palm. Men and women cut their hair and wear a striped sarong. The country produces cocoanuts, cotton cloth, and mats of plantain fibres. The chief articles of import are tin, pepper and iron ware.

*One li=one-third of a mile.

That intercourse between China and the Malay Peninsula was quite definitely established at the time of the Mings may be judged by the accurate descriptions handed down in the Ming Annals. The products of the country were described as lignum aloes, ebony, damar (resin), rhinoceros horns, ivory, tortoise shell, camphor, myrrh, dragon's blood, tin, wax, fine mats, cotton, cocoanuts, agar-agar, birds' nests, sago, mangosteens. The people were known to be Mohammedans, and great fishermen who went out to sea in canoes fashioned out of a single tree.

Emigrants in Siam, Champa and Formosa traded between their countries and the new land further south; some settled permanently in Malaya. Cheng Ho visited Malacca in 1409 in the course of his journey to the "Western Ocean."

The great influence exerted by the Chinese traders and settlers in Malacca suffered a decline when the Portuguese came. On the defeat of the Sultan of Malacca by the Portuguese in 1510, the Ming emperor of the time commanded Siam and other tributary states of China to drive out the invaders, but this order was not obeyed. The British occupied Singapore in 1818, when they found Chinese already in possession. Sir Stamford Raffles, founder of Singapore, remarked a few years later that the population of 10,000 to 12,000 consisted principally of Chinese.

Immigration of Chinese into Malaya has been proceeding on a large scale since the 19th century, with occasional setbacks on account of depression in the tin and rubber industries. The demand for labour to work the tin mines and rubber plantations has been very great, and although Indians from southern India have been found serviceable as tappers in the rubber estates, the success of tin mining in this country has been largely due to Chinese labour.

Table III giving the population of the Straits Settlements from 1821 to 1921 shows the large proportion of Chinese settlers. These figures do not include the population of the Malay States situated on the mainland of the Peninsula, but apply only to the Crown Colony comprising Singapore, Penang and Malacca.

Chinese emigration to Malaya has been influenced almost solely by the fluctuations in trade and industry in that country. When the War started, there was a distinct drop, for not only were the labour conditions unsatisfactory then, but shipping facilities were insufficient and unemployment was rife. The Straits Settlements government was led to introduce restrictive legislation against the number of immigrants permitted into the colony. There was also an outward movement of Chinese labour from Malaya, large

numbers of workers being repatriated to their native provinces by the authorities or by private benevolent organizations. A similar adverse movement took place during the great slump of 1931-34, when rubber and tin prices fell steeply and the population of Malaya was considerably impoverished. Unemployment was even more severe and extensive, not only among the labour population but also among higher wage and salary earners. The British government was faced with the twin problems of restricting further imported labour and repatriating those who could no longer find work in the tin mines and rubber estates. The result of various ordinances passed at Singapore was the introduction of a quota system for Chinese immigrants, as well as stricter requirements (medical and otherwise) for admission into the British colony. There is a suspicion that the underlying causes of these restrictions are not purely economic.

TABLE III

Year	All races	Chinese	Per cent of all races
1821	4,727	1,159	24.5
1824	10,683	3,317	31.0
1825	11,851	3,828	32.3
1826	12,905	4,229	32.8
1827	13,732	6,088	44.3
1828	*	6,210	—
1829	18,819	7,575	40.3
1830	*	6,555	—
1832	*	7,762	—
1833	*	8,517	—
1834	*	10,767	—
1836	*	13,749	—
1840	*	17,704	—
1849	59,043	27,988	47.4
1860	*	50,043	—
1871	308,097	*	—
1881	423,384	174,327	41.2
1891	512,342	227,989	44.5
1901	572,249	281,933	49.2
1911	714,069	369,843	52.7
1921	881,939	432,764	49.1

Many of the new emigrants (*sinkheh*, *hsin-k'o* 新客) usually sign contracts for one year to perform some kind of unskilled labour. Later they are known as *laukheh* (*lao-k'o* 老客) and earn higher wages. Table IV gives the numbers of Chinese entering the Straits Settlements (Singapore, Penang and Malacca) between 1881 and 1915. Later figures, wherever available, will be shown in the next section.

*Figures not available at time of writing.

TABLE IV

Year		For Singapore	For Penang	For Malacca	Total
1881..	...	47,747	42,056	*	89,803
1882..	...	55,887	45,122	*	101,009
1883..	...	61,206	47,930	*	109,136
1884..	...	68,517	38,231	*	106,748
1885..	...	69,314	42,142	*	111,456
1886..	...	87,331	57,186	*	144,517
1887..	...	101,094	65,348	*	166,442
1888..	...	103,541	62,812	*	166,353
1889..	...	102,429	44,441	*	146,870
1890..	...	96,230	36,044	*	132,274
1891..	...	93,843	49,066	1,355	144,264
1892..	...	93,339	45,227	882	139,448
1893..	...	144,558	68,251	908	213,717
1894..	...	106,612	46,230	1,112	153,954
1895..	...	150,157	60,559	2,060	212,776
1896..	...	142,358	57,055	1,325	200,738
1897..	...	90,828	41,124	328	132,280
1898..	...	106,983	44,811	625	152,419
1899..	...	117,794	51,299	1,323	170,416
1900..	...	159,571	72,821	537	232,929
1901..	...	157,657	66,411	*	224,068
1903..	...	172,770	75,401	271	248,442
1904..	...	163,079	39,215	357	202,651
1905..	...	136,001	35,645	187	171,833
1907..	...	179,756	44,495	467	224,718
1908..	...	121,639	29,387	134	151,160
1909..	...	120,954	27,529	96	148,579
1910..	...	173,423	37,955	790	212,168
1911..	...	215,036	49,875	427	265,338
1912..	...	203,124	44,284	103	247,511
1913..	...	240,979	37,161	*	278,140
1914..	...	124,032	41,988	*	166,020
1915..	...	80,352	26,698	*	107,050
Total	...	4,088,141	1,573,799	13,287	5,675,227
Yearly average	..	123,883	47,691	696	171,977

There has always been a great disparity between the sexes of Chinese emigrants. For instance, among those going to Singapore the proportion is one female to 17 males; in the case of Penang, one female to every 14 males. The natural consequence is that many of the settlers contract marriages with the indigenous women, although they may have wives and families in China. Thus we find that a certain proportion of Chinese of the third or fourth generation in Malaya are descended from old pioneers from Kwang-tung or Fukien who had married Siamese, Burmese or Malay women.

*Figures not available at time of writing.

(c) In the Netherlands East Indies

The first settlements of Chinese in the Netherlands colonies in the South Seas began in the fifteenth century when adventurers sailed from Formosa and the neighbouring regions in junks to trade with more distant lands. These early pioneers traded peacefully with the natives and became very prosperous. The Chinese, as a result of conflicts with the Dutch colonists, lost for a time their influence and prosperity. They have however managed to expand commercially, so that today they exert an important influence on the economic life of the islands. The Chinese in Java and Dutch Borneo are mostly business and professional men and small traders, while those in Banka and Billiton are overwhelmingly tin-miners under contract.

The first Chinese to set foot in Java was a Buddhist priest named Fa-Hsien who lived in the later Han dynasty. He landed in Java on his way back from a pilgrimage to India, and stayed five months, from December 413 to May 414 A.D. In the T'ang Annals (T'ang dynasty, 618-906 A.D.) the following passage occurs:—

Kaling is also called Djava, which is situated in the southern ocean, to the east of Sumatra and to the west of Bali. Toward the south it has the sea and toward the north lies Camboja. The people make fortifications of wood and even the largest houses are covered with palm leaves. They have couches of ivory and mats of the outer skin of bamboo. The land produces tortoise shells, gold and silver, rhinoceros horns and ivory. The country is very rich. There is a cavern from which salt water bubbles up spontaneously. The inhabitants make wine of the hanging flowers of the cocoa palm, and when they drink it they quickly become intoxicated. They have letters, and are acquainted with astronomy. In eating they do not use chopsticks or spoons.

As a result of an insult to a Chinese envoy, Kublai Khan (Yuan dynasty) sent an army of 20,000 soldiers gathered from Fukien, Kiangsi and Hukuang (now Hunan and Hupeh) with a year's provisions and 40,000 bars of silver, to Java. The Chinese defeated the natives in several battles in 1293 A.D. and finally returned to Chuanchow.

The Emperor Yung-Loh of the Ming dynasty in 1403 sent many of his favourite eunuchs to lands south and south-west of his dominions, such as Thibet, Siam, Bengal and Java, to extend his sway. The most famous of these eunuchs was Cheng Ho who made several voyages to the "Western Ocean" and left his mark in many lands. Even to this day, his name (he was known as "San Pao" or "Wang San Pao" abroad) is revered by Chinese in French Indo-China, the Dutch East Indies and the Philippine Islands.

The Chinese had been long in Java when the Dutch first arrived there in 1595. For many years after that, Chinese settlers acted

as agents both in political and commercial affairs for the Dutch in their dealings with the natives. Later, conflicts arose as the Dutch grew more and more assertive in proportion as the prosperity of the island increased. The natives, encouraged by the attitude of their Dutch masters, began to illtreat the Chinese merchants. Matters came to a head when 200 Chinese were put on a ship ostensibly for deportation, and were then thrown overboard. The Chinese revolted against the Dutch government in 1740 and carried on a bloody war for two years until a general amnesty was declared in 1742.

As in the case of Malaya, the overwhelming majority of Chinese settlers in the Netherlands Indies came originally from Kwangtung and Fukien. In order of importance, the districts supplying emigrants are: (a) Changchow, Chuanchow and the Amoy hinterland; (b) Chia-ying and the Mei district in Kwangtung; (c) Swatow and its hinterland; (d) Canton, and the districts of Sunning (Toishan) and Hsinhui; (e) Foochow and Hinghua; (f) Hainan. A few went originally from Hunan, Shanghai and Shantung.

Intermarriage is very common, more so than in Malaya. The third and fourth generations of Chinese are usually descendants of Chinese pioneers and native women.

(d) In the Philippines

The history of the Chinese in the Philippine Islands since the first settlements in the fifteenth century has been one of remarkable commercial progress mixed with persecution. Thus it has been with Chinese emigrants all over the world. Their industry, their infinite capacity for enduring hardship, their business sense, their love of peace—these are the very qualities that have made them the target for ruthless violence on the one hand, and for degrading legislation on the other. The weakness and incapacity of the home government, especially during the Manchu oligarchy, added fuel to the flame of jealousy and savagery that has characterized all colonizing powers at one stage or another in their history of conquest or "peaceful penetration". The strong have always oppressed the weak throughout the ages, and defenceless Chinese traders and labourers in lands far away from their native shores were ever reminded of the impotence of their fatherland by the attitude of rulers in the countries of their adoption. Not that all Chinese abroad have been uniformly persecuted; the benign policy of the British government, for instance, in Malaya, excepting for one or two dark periods when vindictive governors attempted to revert to obsolete methods of coercion, has enabled the Chinese domiciled there to live a secure and prosperous existence.

The first mention of the Philippines was made in a geographical work called the *Chu Fan Chi* (A Record of Foreign Countries) published by Chau Ju-kua of the Sung dynasty between 1209 and 1214 A.D. Here the islands were referred to as *Ma Yi*. In the reign of the Ming emperor Hung Wu, an embassy arrived from the Philippines bearing tribute to the Celestial Empire (1372). Several more embassies reached China after this date, until an interruption occurred as a result of the depredations of the pirate Lien Tao Ch'ien in 1571, who sacked the city of Manila and disrupted the trade between China and the islands. A Chinese fleet was sent against him and peace was restored. The rulers of the islands resumed tribute until well through the Tsing dynasty. There is no doubt that for a great number of years China exercised overlordship over the Philippine Islands.

There has been some question as to whether there were Chinese settlers before the Spanish occupation. The Ming Annals (Book 323), however, contain references that leave no doubt as to the priority of the Chinese in the islands. Thus:

Formerly the people of Fukien lived there (i.e. Luzon), because the place was conveniently near. They were traders of abundant means, 10,000 in number, who, as a rule, took up long residence there and did not return home until their sons and grandsons had grown up. When, however, the Franks snatched away this country the Spanish king dispatched a chief to suppress the Chinese. As he was concerned lest they might revolt, he expelled many of them. All those remaining had to suffer from his encroachments and insults.

The period following the Spanish occupation in 1565 was marked by friction which often broke out into open massacre. As a result of the flogging to death of some Chinese who helped the Spaniards in 1593 (21st year of Wan Li), the rest revolted, killed the Spanish chieftain and sailed for Annam. In 1603 a terrible massacre of 25,000 Chinese was perpetrated by the Spanish governor who incited his men to kill and rob wherever they could. Two other tragedies befell the Chinese in the islands, one in 1639 when 22,000 were killed in an insurrection, and the other in 1662 resulting from the refusal of the Chinese to leave the islands: they rose and attacked Manila but were mown down by Spanish guns.

Apart from these violent attacks, the Chinese suffered heavily at the hands of their rulers, their liberty to trade was restricted and many were hanged as a result of their siding with the British in 1762 when the latter demanded the surrender of the islands.

The lot of the Chinese was not improved after the Spanish-American War, 1898, when the Philippines became a colonial possession of the United States. The first act of the new govern-

ment was the application of the Chinese exclusion law to the islands. Under this ordinance all Chinese, except former residents who had left the islands between December 31, 1895 and September 1898, and those belonging to the exempted classes, were refused permission to land. This was supplemented in 1903 by an act which provides for the registration of Chinese by customs officials and the deportation of all Chinese not legally registered within two years. Recently, however, especially since the passing of the United States act conferring commonwealth status upon the Filipinos and complete independence after ten years, the rulers of the islands have realized the important part played by Chinese in the economic life of the country, and some of the prominent leaders have expressed themselves as favouring the admission of Chinese under certain conditions.

It is a well-known fact of history that much of the commercial and industrial development of the Philippines has been due to the efforts of Chinese resident there. Even the Spaniards at the height of their power acknowledged the vital role played by the early Chinese pioneers. An observer writing in 1899 mentioned among other things:

Except a few Europeans and a score Western Asiatics, the Chinese who remained were the only merchants in the archipelago. The natives had neither knowledge, tact, energy, nor desire to compete with them. They cannot even at this day do so successfully, and the Chinese may be considered a boon to the colony, for without them, living would be much dearer, commodities and labour of all kinds more scarce, and the export and import trade much embarrassed. The Chinese are really the people who gave to the natives the first notions of trade, industry and fruitful work. They taught them, amongst many other useful things, the extraction of saccharine juice from sugar cane and the working of wrought iron. They introduced into the colony the first sugar mills with vertical stone crusher and iron boiling pans.

The above appreciation would apply with equal force to Chinese in other Asiatic lands, such as Malaya and Java. It is a tragedy that in spite of the industry, peaceful nature and other sterling qualities of colonization of Chinese settlers, the history of Chinese emigration has been criss-crossed with innumerable examples of persecution, sometimes insidious, often bloody. The fundamental cause underlying this conflict between the rulers and the governed has been, in our considered opinion, the terrible weakness and inefficiency of the home government which was neither able to protect its citizens abroad nor command respect at home. We have but to observe the different attitude adopted by the European and American colonial powers towards subjects of another Eastern country residing in their possessions, to realize that nothing can replace "power diplomacy" in the dealings between nations.

In the Philippines as elsewhere, Chinese settlers have inter-married with the natives. The offspring of unions between Chinese and Spaniards, and Chinese and Filipinos, belong to a distinct class of the population known as *mestizos* or people of mixed blood. These people are usually thrifty, shrewd, intelligent, industrious and business-like. They are more progressive than the pure natives and more successful in the trades and professions. They form more than one-sixth of the population of the archipelago. Of the pure Chinese, who number more than 120,000, the majority are Fukienese; these control mostly the banking, import, export and lumber trade while the Cantonese run the hotels, restaurants, laundries and grocery stores.

(e) *In Siam, Burma, Indo-China*

Siam is the country with the largest Chinese population outside of China, there being over two-and-a-half millions. From the earliest times there has been intercourse between China and Siam, and Chinese settlers have formed the backbone of the country. For a long period China exercised suzerainty over the Siamese Kingdom, and her citizens have always occupied the leading positions in industry, trade and banking. The rice milling and lumber (especially teak wood) industries have been largely in the hands of the Chinese. Chinese immigrants control the carpentering and building trades, and even infiltrate into the agricultural areas. In spite of the policy of the Siamese government to consider all Chinese immigrants citizens of the country and therefore subject to its conscription and other laws, the Chinese have always remembered they are of Chinese race and have never failed to take a practical and weighty interest in the fortunes of their fatherland. Much intermarriage exists between the natives and the Chinese, as is often the case when emigrants do not take their womenfolk with them to their lands of adoption. The recent anti-Chinese legislation proves again that even small nations imitate their powerful neighbours in bullying tactics against the emigrants of a country that has lost its prestige through internal dissensions or foreign aggression.

There are some 300,000 Chinese in Burma, and although they are as a whole not so influential as Chinese in other places (due to the intense nationalism of the Burmese), they control more than 60 per cent of the total rice production of the country.

Indo-China has a population closely akin to the Chinese in racial characteristics. Even up to the time of the Tsing dynasty, the country had acknowledged the overlordship of China. The Chinese were victorious over the French in Annam in the late 19th

century but the Emperor in Peking signed a treaty ceding that territory to France. It was the first and only occasion in history in which the victors in a war gave away valuable territory and concessions to the vanquished.

Here again, intermarriage is common, and it is difficult to differentiate between the descendants of the original Chinese immigrants and the natives of the country.

(f) In Hawaii

The Chinese in the Hawaiian islands present not only an instructive picture of early Chinese pioneering but also an interesting problem in ethnology. That Chinese farmers should have adventured so many thousand miles into the wastes of the Pacific Ocean in frail junks is not surprising when we think of similar odysseys to the southern isles and to the vast spaces of the New World. The pioneers were plantation labourers under contract who, after amassing considerable wealth, elected to stay in the new land, intermarried with the native Hawaiians and became true sons of Hawaii. The operation of the U.S. exclusion laws has adversely affected both the ratio of Chinese to the general population, and the economic advance of the islands. Some of the basic industries, such as rice and taro cultivation, have also declined as a result of the inadequacy of Chinese labour. Social barriers, however, are practically non-existent. Race intermixture has helped to breed a true cosmopolitan spirit in the Territory, and the fact that Chinese, whether of pure blood or of mixed ancestry, are American citizens is a potent factor in Hawaiian harmony.

History records that Chinese had settled in some of islands even before the voyage of Captain Metcalf in 1789 from Macao with a crew of 10 Americans and 45 Chinese. The islands were known then as the Sandwich Islands but to Chinese, who did a big trade, especially in sandalwood, they were, and are still, called "Sandalwood Mountains" (檀香山). The need for labour to supplement the decreasing native labour, gave rise to a certain amount of Chinese immigration between 1789 and 1852. From the latter year to 1864 the entry of Chinese workers received the necessary fillip through the legalization of the coolie trade. What the native rulers of those days thought of this new influx of an alien people may be judged by the following remarks of a Hawaiian prince in 1864:

Chinese have been introduced here and more are on their way hither. With all their faults and a considerable disposition to hang themselves, they have been found very useful. Suffice it to say that some of our largest sugar and coffee plantations are now chiefly dependent upon them for the principal amount of labour done. That they might be better than they are, ought not to be used as an argument against them. That they are

procurable, that they have been procured, that their wages are reasonable, that you can calculate on retaining them for a certain term, that the climate suits them, and that they are handy in the house and in the fields are great facts. Excepting what relates to these coolies, all that bears upon the subject of imported labour is just theory and speculation.

From 1865, assisted immigration of Chinese labour was undertaken on a large scale, and Chinese began to pour into the islands. The natural consequence was the imposition of restrictions to free entry. In contrast to many other countries which first adopted partial exclusion laws against Chinese immigrants, the original reason was not economic but hygienic. Owing to the overcrowded and insanitary conditions on board vessels carrying immigrants, and the lack of proper medical examination and selection at the ports of embarkation and of quarantine measures at their destination, passengers who developed or were incubating smallpox and cholera spread these diseases among the population on landing. The first measure adopted by the Hawaiian government was an act passed in 1878 which stipulated that:

Any ship passing from China or any other Asiatic ports, and calling at any port in this Kingdom on her voyage, shall not be permitted to disembark passengers at any port in this Kingdom without first having obtained the assent in writing of the governor of the island, or the collector of the port at which said ship may call.

Chinese immigration continued in spite of these restrictions. In 1881, thousands of Chinese were brought in as a result of fraudulent representations by the captains of vessels who certified their ships free of disease when in fact they were infected with smallpox.

The excess of males over females brought protests to the Hong-kong government from the Hawaiian authorities. Licence restrictions adopted by the New South Wales and Queensland (Australia) governments prompted Hawaii to impose fees for licences without which no Chinese labour could be imported. A further measure was passed in 1883 whereby only certain vessels belonging to specified companies were permitted to carry immigrants. These ships were chosen because they were clean and well-equipped, and carried competent surgeons. The screw was tightened as the years rolled by, in spite of the protests of planters who found themselves short of labour, until in 1885 no more than 25 Chinese were permitted to land from any one vessel, excluding those who were in possession of passports. The following year (1886) a rigid exclusion law was enacted providing that no Chinese passenger be allowed to land at any port in the Hawaiian Kingdom unless such passenger possessed a passport proving previous residence. Exceptions were merchants for a limited period, families of resident Chinese, officials of the Chinese government, teachers and Christian ministers. A loosening of these restric-

tions was noticeable in subsequent years, resulting from repeated petitions of planters who were very concerned with the shortage of labour. In 1892 the Hawaiian Legislature enacted that no Chinese were permitted to enter the Kingdom excepting women, children, travellers, merchants, clergymen and business men, who all had to possess passports; Chinese labourers were barred except those who were to engage in agricultural work in the fields or in rice and sugar mills.

When the United States annexed the islands, the U. S. exclusion laws in force in continental United States were applied to the new Territory. Persistent protests by sugar planters who saw their industry handicapped if not ruined by shortage of cheap labour and intense Japanese competition and economic domination, were only partially successful on account of the objections of American labour. At the present time, Japanese residents far exceed Chinese settlers, and control more and more the economic life of the islands.

(g) *In other countries*

Only a few words need be said about Chinese in other countries. They are to be found everywhere, in large aggregations or small groups, pursuing their several vocations peaceably and in conformity with the laws of the land.

The gold rush of 1850 was responsible for a great influx of Chinese into the *United States*. They also supplied the principal labour for the construction of the western portion of the first U. S. transcontinental railway as well as of the Canadian Pacific system in Canada. Most of these emigrants were derived from Kwangtung, principally from districts along the delta of the Pearl River. In the early days of American colonization the Chinese were welcomed because white labour was scarce and expensive. Later, however, the onward rush of white settlers resulted in much persecution and finally complete exclusion of Chinese labour, as we have told in an earlier section of this article. There are at present about 75,000 Chinese in the United States but these are mostly second generation settlers. The largest Chinese community in that country is to be found in San Francisco where nearly 20,000 Chinese reside. Here Chinatown is a real bit of the old China, with its own shops, newspapers, clubs and Chinese houses. The status of the American-born Chinese in America is an unenviable one. He has learnt American ways and is imbued with western culture. Yet he yearns for the land of his fathers. But he is ignorant of Chinese manners and conditions, and as a rule also unfamiliar with the national language and literature, although in his home he may still speak the patois of his ancestral district. If he turns to the people of his land of

adoption he finds that an invisible barrier of racial and economic prejudice is at once erected: he is made to feel, with rare exceptions, that he is an intruder—a member of an alien race, unassimilable and unwanted. Many restrictions are put in the way of Chinese, even those of the merchant, traveller, official and student classes who contemplate visiting the country. At the present time, with the exception of students and government officials, Chinese living in the United States occupy themselves with retail shop-keeping, domestic service, gardening, canning, laundrying and restaurant-keeping.

The history of Chinese immigration into *Canada* follows closely the course taken in the United States. Thus, while Chinese labour was welcome at the beginning, hostility developed rapidly until today an impassable barrier to their entry is presented at every Canadian port. Those remaining in the country, numbering about 46,000, are engaged in fisheries, canneries, lumber camps and timber mills. There are also Chinese ranchers, farmers, market gardeners, restaurant keepers, laundrymen and greengrocers. Feeling against Chinese in both Canada and the United States is much less in the eastern part of the continent.

The record of persecution of Chinese settlers in *Mexico* is too recent to need further comment here. Mexican desperadoes, with or without the tacit connivance of the authorities, forced all Chinese shops to close down, maltreated harmless and defenceless men and women, and drove large numbers at very short notice from their homes. Savage legislation was enacted having as its object the ruin of Chinese residents. Many have returned to China in a destitute condition. Of late, persecution has eased off but there is no guarantee that disorders may not again occur unless the authorities are made aware that a strong home government is prepared to employ all available measures for the protection of its citizens abroad.

In *Central* and *South America*, many Chinese are engaged in agricultural pursuits, but a good number are successful merchants, while the more wealthy ones own cocoa, banana or coffee plantations. Intermarriage with Spanish descendants of the old conquistadors is not uncommon. As a whole, the Chinese settlers retain a feeling of interest and sympathy for their fatherland. Chinese in the Americas, including the West Indies and Cuba, have never been treated on an equal footing with other peoples, even other Asiatics. Persecution has not uncommonly broken out into mob violence whereby much Chinese property and lives have been destroyed. There are today 10,000 Chinese in Central America, a few thousands in South America, 30,000 in Cuba and 50,000 in the West Indies.

In *Great Britain* there are about 8,000 Chinese made up mostly of seamen and others connected with shipping in the ports of London, Liverpool and Southampton, restaurateurs and laundrymen, students, a few merchants and officials. British tolerance and sympathy for foreigners within their shores are well-known, and Chinese residents have never experienced the terrors of sudden savage attacks or barbaric persecution that have been the lot of many of their fellow-countrymen in certain other parts of the world.

The exclusion laws of *Australia* have in recent years completely prevented Chinese from entering the Commonwealth. Even students are not encouraged. While evidence points to the discovery of this continent by explorers centuries before it was known to the western world, it was not until after the conclusion of the First Opium War between China and Britain and the Treaty of Nanking, 1842, that many Chinese landed in New South Wales to take part in the gold rush and work in the gold fields. The European colonists in those days also employed Chinese labour for their sheep ranges. Today the number of Chinese residents has dwindled to about 15,000 as compared with nearly 40,000 in 1881. The majority are to be found in Queensland, New South Wales and Victoria, and are mostly of Cantonese ancestry. They work as market gardeners, agricultural labourers, miners, shopkeepers, grocers and fruiterers. A small but influential group is made up of wholesale merchants and professional men. Although economic factors are at the bottom of the rigid exclusion legislation, race prejudice also plays a part. There has been much intermarriage and most of the Chinese descendants of the old pioneers have western blood in their veins.

There are over 17,000 Chinese in *South Africa*, engaged in the usual occupations of Chinese settlers in other countries, such as market gardening, mining, shopkeeping. We have already referred to the indentured Northern Chinese labour that was recruited for the Transvaal to work in the gold mines in the Witwatersrand at the end of the last century, and finally repatriated.

6. THE PRESENT EMIGRANT SITUATION IN CHINA

(a) *Situation in South China prior to establishment of the National Quarantine Service*

The history of emigration from China during the past few years is closely bound up with the development of the National Quarantine Service in South China. Previous to 1930, when the National Government decided, with the assistance of the League of Nations, to establish a nation-wide service to coordinate and control all port health activities, the examination of prospective emigrants had not been

quite satisfactory either to the emigrants themselves, to the prestige of the country, or to the receiving governments. Malpractices arose, as is natural when the opportunity is thrown at individuals working under loose control or almost independently, of making large sums of money from ignorant country folk easily and quickly. Some made huge fortunes from miscellaneous fees charged to poor peasants who desired to seek a livelihood abroad but suffered intensely both financially and physically at the hands of those whose duty it was to pass them for "export."

It was not until 1866 that an organized attempt was made by a steamship company to operate a fleet of emigrant vessels to the Straits Settlements and Philippine Islands. In 1904, an Emigration Convention was drawn up in London between China and Great Britain, which stipulated that emigrants should be medically examined by a qualified medical officer nominated by the British consular officer or his delegate; and that all ships should be inspected and certified to conform to the necessary requirements, namely, seaworthiness, cleanliness, sufficiency of provisions, medical stores and hospital equipment for the number of emigrants declared for the intended voyage.

In 1916, compulsory vaccination of immigrants was introduced and enforced by the governments of the Straits Settlements and Burma. The Singapore ordinance provides for every deck passenger to be vaccinated at the port of embarkation, on board ship, or at the port of destination. For the sake of convenience and thoroughness, the first-mentioned procedure has been adopted as far as emigrants embarking at Chinese ports are concerned. Prior to 1931, medical inspection of emigrants for Singapore was conducted by the British emigration medical officer; since that date it has been jointly carried out by the Chinese quarantine officials and the British emigration medical officer. The British Emigration Officer (who is usually the British Consul) is present at each inspection and checks the number of emigrants with the official lists.

The Netherlands East Indian Government is not so much concerned with vaccination as with a thorough medical examination of passengers bound for the Netherlands East Indies. On arrival, a poll tax of 150 guilders per capita is levied, recoverable if residence does not extend beyond six months. This tax used to be 25 guilders.

On account of the operation of the American exclusion laws in the Philippines, emigration to that country has never assumed the proportions reached in the traffic to British Malaya. The type of emigrant also differs. Whereas labourers form the vast proportion of newcomers to the tin and rubber districts of the Malay States, arrivals at Philippine ports belong generally to the merchant class.

It may be interesting to give a short resumé of the methods adopted at Amoy with regard to emigrants bound for the Philippines, prior to the establishment of the quarantine service at Amoy. Vaccinations were performed by the U. S. Public Health Officer or by his assistants. The prospective passengers were then inspected 24 hours later for the purpose of determining the nature of the reaction. In the event of an "immune reaction" the passenger was passed. A second inspection would be required the next day if it was a "doubtful reaction," and a third (at an interval of six days after the second inspection) if it was a "take." Occasionally a fourth inspection was required after another interval of six days if the reaction was one bordering between "take" and traumatic. The emigrant with a successful vaccination must leave the port within a fortnight from the date of release marked on a card, otherwise he would have to submit to the same procedure all over again. The inspection was held daily between the hours of ten and eleven in the morning, and vaccination was performed between eleven and noon.

Washing and bathing of the passengers, and disinfection of luggage and other personal effects, were made compulsory in 1911. The prospective emigrants were compelled to have these done between 10.30 and 11.30 on the morning of the day of departure. They had to be ferried across the harbour in all weathers to the disinfecting plant and await the arrival of the officer—if they happened to be too early, or stand a good chance of being rejected, if they were late. This regulation was rescinded by the Philippine government in 1926.

Again, apparently as a precaution against the introduction of cerebro-spinal meningitis into Manila, the Philippine government required all deck passengers to have their temperatures taken by the U. S. Public Health Officer on the day of embarkation. Then finally, after embarkation was complete, the crew and passengers were lined up for inspection which consisted mainly in the checking of vaccination cards and identification of photographs.

(b) Emigration figures

The rate of emigration kept steady previous to 1928, on account of the demand for cheap labour in the tin mines and rubber plantations of Malaya, and the recovery of trade some time after the War. About 100,000 to 120,000 entered Singapore, the Malay States and Burma annually, between 20,000 and 25,000 the Netherlands Indies and over 25,000 the Philippine Islands. Various factors, such as quota restrictions, increase of the poll tax in several immigration countries, collapse of the industries in the South Seas, and a sharp increase in passage rates from China, have contributed to a serious falling off in numbers of emigrants. Deck passages have increased

from \$20 to \$100 and over, while reference has already been made to the slump in rubber and tin in Malaya leading to mass unemployment.

From July 1930 to September 1931, only 5,000 emigrants per month were permitted to enter the Straits Settlements from China ports; this figure was reduced to 2,500 between October 1931 and May 1932, and further shrunk to 1,000 between June 1932 to April 1933. The rise of Malaya from the great slump resulted in an increase of the quota to 4,000 from August 1933; this figure has lasted up to the time of writing.* Every alien passenger (that is, one not in possession of British citizenship) entering the Straits Settlements has had to pay a landing tax of five Straits dollars (about \$10 in Chinese currency) since 1932.

Immigrants for Burma are required to take out a passport issued by the Chinese government and visaed by the British consul at the port of embarkation. The cost to each emigrant for Rangoon is thus \$4.60 plus a visa fee of twelve shillings and sixpence (about \$10-12).

During the first year of the National Quarantine Service at *Amoy* (1931), 56,924 passengers left that port on 240 sailings of emigrant vessels. Of these 6,251 were cabin and 50,673 deck passengers. Singapore and Burma received 26,268, the Philippines 17,217, and the Netherlands East Indies 13,439. A substantial decrease was registered in 1932 owing to the tightening of restrictions by the Straits Settlements government and the increase in the per capita poll tax by the Netherlands authorities. Of 41,044 emigrants who left Amoy for abroad, 35,467 were deck passengers and 5,577 cabin. There were 200 sailings of emigrant vessels. Malaya and Burma took only 12,412, Java 10,997, while the remainder, 17,635, went to Manila. There was a further decrease the following year (1933) when 4,513 cabin and 33,267 deck passengers (total 37,780) left for other countries from Amoy, made up of 11,314 for Malaya and Burma, 10,623 for Java, and 15,843 for Manila. In 1934, the position improved with the partial lifting of restrictions by Singapore as a result of the improvement of trade and industry in Malaya. A total of 51,781 emigrants (of whom 47,813 were deck passengers) were passed at Amoy: for Singapore and Burma, 28,431; for Java, 10,688; and for Manila, 12,662. There were 192 sailings of emigrant vessels during that year. 1935 was the peak year with as many as 64,762 emigrants leaving the shores of Amoy on 215 sailings of emigrant

*We understand the quota is to be further increased to 5,000 per month.

vessels. Malaya and Burma received 40,957 immigrants; the Netherlands Indies 13,072; and the Philippines 10,733.*

The emigrant traffic from the Kwangtung port of Swatow has if anything been greater than that of Amoy, although the factors affecting Amoy emigration also obtained in Swatow. For instance, in 1931—80,202 left for foreign countries; in 1932—36,824; 1933—44,958; 1934—56,056; and 1935—92,938. That the inward and outward traffic before the world depression had been enormous may be gauged by the figures for 1927 and 1928. In the former year a total of 2,370,224 passengers left and entered Swatow, and in 1928, 2,242,343. The ratio of emigrants for the receiving countries has been fairly uniform since 1931. Thus, of the total leaving Swatow, 63 per cent embarked for Singapore; 30 per cent for Bangkok, Siam; and 7 per cent for Saigon, French Indo-China.

Table V gives the relative and total figures of emigrants from Amoy and Swatow from 1931 to 1935, inclusive:—

TABLE V

	<i>From Amoy</i>		<i>From Swatow</i>
1931	For Singapore: 26,268 Java: 13,439 Manila: 17,217	56,924	For Singapore: 50,526 Siam: 24,060 Saigon: 5,616
1932	For Singapore: 12,412 Java: 10,997 Manila: 17,635	41,044	For Singapore: 23,197 Siam: 11,046 Saigon: 2,581
1933	For Singapore: 11,814 Java: 10,623 Manila: 15,843	37,780	For Singapore: 28,325 Siam: 13,488 Saigon: 3,145
1934	For Singapore: 28,431 Java: 10,688 Manila: 12,662	51,781	For Singapore: 35,318 Siam: 16,818 Saigon: 3,920
1935	For Singapore: 40,957 Java: 13,072 Manila: 10,733	64,762	For Singapore: 58,552 Siam: 27,882 Saigon: 6,504
Total (1931-35):		252,291	310,978

Grand Total of emigrants from Amoy and Swatow for the 5 years, 1931-35: 563,269.

Average: 112,654 per annum.

Note: These figures, of course, do not take into account the large numbers of Chinese who return every year to their native districts. On the whole, with the exception of the slump years, many more Chinese left than returned to the emigrant ports.

*1936 figures are: 64,270 emigrants and 234 sailings of emigrant vessels.

(c) *Fares, taxes and miscellaneous fees*

We have referred to the great increase of steamer fares in recent years. The whole story is not yet told. Although the shipping companies have a regular tariff, the emigrants are mulcted in larger sums than are shown in the books of the companies. Thus, fares for deck passengers from Swatow to various receiving countries are based on the scale shown in Table VI:

TABLE VI

<i>From Swatow to Singapore:</i>		<i>Swatow currency</i>
New emigrants .. . . . .	..	\$55.00
"Old" emigrants .. . . . .	..	40.00
Women (families of old or new emigrants) .. . .	..	40.00
Children .. . . . .	..	Half rates
<i>From Swatow to Bangkok:</i>		
Adults (both old and new) .. . . . .	..	\$16.00
Chinese .. . . . .	..	Half rates
<i>From Swatow to Saigon:</i>		
Adults (both old and new) .. . . . .	..	\$15.00
Children .. . . . .	..	Half rates

These rates are, however, only the shipping companies' tariff. Passages are sold in the market for much more. For instance, new emigrants for Singapore have to pay \$100 or over for a deck passage, the difference going into the pockets of various brokers, agents, lodging house keepers, etc. who are connected with the recruiting of emigrants and are more or less sponsors of those who are too poor to pay even their fares. In these cases, the brokers advance money and collect, if possible, from the emigrants later. Those going to Bangkok and Saigon pay \$30 or over. The same practice obtains in Amoy.

Table VII gives a list of the taxes and charges that have to be paid by emigrants on landing at their destination:—

TABLE VII

(d) Remittances from oversea Chinese

It is common knowledge that China has had adverse trade balances for many years. The value of her imports far exceeds that of her exports, and she has got to pay for this difference in foreign exchange or bullion. How then has she been able to carry on and yet remain solvent? This has been accomplished, among other factors, by the volume of *invisible* imports—items that cannot be found among Customs statistics. As this is not a treatise on economics, we need only mention here that the annual remittances to China from oversea Chinese form one of the most important and vital items in the list of invisible imports that have kept this country “out of the red.” The total sum received from all over the world reaches enormous proportions, but here we are concerned only with money sent home by former emigrants who have made good in the lands of their adoption, but who have not forgotten their country or the families left behind.

Remittances of this kind from the Philippine Islands totalled \$50,000,000 in 1931, \$35 millions per annum in 1932 and 1933, and between \$10 and \$15 millions for each of the years 1934-5. The effects of the world-wide depression may be seen from the difference between 1931 and 1935. The largest amounts are usually remitted during the winter season, generally towards the end of the Chinese New Year (old calendar). Chinese in the Netherlands East Indies sent home in 1931 a total of \$15 millions, and between 1932 and 1935 from \$5 to \$8 millions per annum. Malaya was not backward in contrast to the Philippines and the Netherlands Indies. \$15-\$20 millions were remitted home by Chinese in 1931, \$3-\$5 millions in 1932 (during the height of the slump), \$12-\$15 millions in 1933, \$15-\$20 millions in 1934 and \$20-\$22 millions in 1935.

Emigrants who originally left from Swatow have also sent home huge sums yearly. Remittances from Singapore and other points in Malaya predominate. Prior to the trade depression, as much as \$40 to \$50 millions reached China annually from Malaya, Siam and Indo-China to swell the aggregate of invisible imports. During the last few years the amount has dropped sharply to slightly over \$10 millions.

Apart from the interplay of economic forces in the overseas countries, a potent cause for the fall of remittances has been the unsettled conditions in the home country, leading to a feeling of insecurity and inadequate protection for investments. It is gratifying to note, however, that the government has lately interested itself in its overseas citizens and has, through reconstruction work and increased prestige due to political unification, encouraged large-scale

investment of oversea Chinese capital in the homeland. Enormous sums of money earned and saved by erstwhile emigrants are available for investing in home industries, provided security of capital is assured.

(e) Steamship companies engaged in emigrant traffic

The first steamship company owned by oversea Chinese in Singapore was founded in 1864. It was known as the Wee Bin Company (黃敏公司), chop “Hong Goan” (豐源). It possessed a fleet of 40 vessels. The management later passed into the hands of the late Lim Ho Poa (林和坂), an early emigrant from Amoy, and son-in-law of the founder of the company. From 1907, Mr. Lim Peng Siang (林秉祥), son and heir of the late Lim Ho Poa, took over control and incorporated the line into the Ho Hong Company, forming thereby a shipping department under the name “Ho Hong Steamship Company.” This latter concern used to operate a fleet of five big ocean-going liners engaged in the emigration trade, but on account of shipping disasters, the number was reduced to three. The company subsequently amalgamated with the Straits Steamship Company of Singapore and is now known as the Ho Hong S.S. Co. 1932, Ltd. The three vessels still plying the South China Sea are the “Hong Kheng” (豐慶), “Hong Peng” (豐平) and “Hong Siang” (豐祥) (the last-named christened after the owner)—all providing every facility and comfort for passengers and emigrants.

Prior to 1914, there was another shipping company known as the Seang Line (雙德公司), owned and operated by the late Lim Chin Chong (林振宗), of Rangoon, whose father was a pioneer emigrant from Amoy. Of the fleet of three vessels, two were sunk during the War by the Germans, while the third and last survived only to be stranded in Rangoon harbour and broken up.

Present lines operating the emigrant traffic from South China are shown in Table VIII.

(f) Rejected emigrants

The governments of the immigration countries are very strict with regard to the medical examination of aliens who come under their immigration laws. The duty therefore devolves upon the Chinese quarantine authorities at the ports of embarkation to make a rigid inspection of all prospective emigrants, not only with a view to conforming to the requirements of the receiving countries, but so as to obviate any unnecessary hardship to those liable to be rejected at their destination, and financial losses to shipping companies and others concerned with the transportation and upkeep of emigrants who have to be returned to their homes.

TABLE VIII

<i>Trading Points</i>	<i>Shipping Co.</i>	<i>No. vessels</i>	<i>Schedule</i>
From Amoy to S'pore, Penang; some lines to Rangoon and Calcutta.	Butterfield & Swire (Br.) Ho Hong (Br.) British India & Apcar (Br.) K.P.M. (Neth.) Indo-China S. N. (Br.) Thoresen (Norweg.)	2 3 4 2 5 2	Fortnightly do. do. do. Irregular do.
From Amoy to Manila.	Butterfield & Swire (Br.) J.C.J.L. (Neth.) O.S.K. (Jap.)	1 3 2	Every 10 days Fortnightly do.
From Amoy to Netherlands East Indies.	J.C.J.L. (Neth.) (monopoly of this traffic).	8	Weekly

Apart from purely medical considerations, there is the humanitarian aspect. Among the fundamental duties of Chinese quarantine officers at the emigration ports is the care of rejected emigrants. These people usually come from interior districts and often appear at the port of embarkation quite destitute, having disposed of all their worldly possessions to pay for their passage and other items. Indeed, a good many borrow money from brokers and are in debt even before they sight the ship that is to take them to "fame and fortune" or a worse existence in a foreign land.

Sometimes one member of a family, say, a minor, is rejected on account of some disease, and to throw him on the streets while his people sail for unknown lands is a thing that cannot be contemplated with equanimity. It was therefore natural that humanitarian gentlemen living in daily sight of all the misery and heartbreak of an emigrant port, should have thought of providing a Home for these rejected emigrants where they could be well looked after and treated for their diseases against the time when they would be fit to travel.

The first Rejected Emigrants' Home was founded in Amoy in 1926 as a result of the unselfish labours of Sir Meyrick Hewlett, former British Consul at Amoy and later H.M.B. Consul General at Hankow. Let Sir Meyrick tell the story in his own words:—

There were three or four incidents caused me such real pity for the infinite pathos of some of these human lives who were leaving home on a new venture that I was compelled to do something for them, and could not rest till I did. Shortly after my arrival in Amoy in November 1923, when I was counting labourers in a very full ship, I was shown fourteen little fellows, any age between 7 and 12, and on my asking why they were standing there apart, I was told they were diseased and must be put on shore. They all had

some head disease or skin disease curable with care in 5 or 10 days, but as they could not be isolated on board they were simply put off the ship without any provision of any sort whatever, merely to become beggars or starve, and no-one cared. I refused to allow them on shore till I found a grown-up relation, and though it caused much discontent among the shipping interests, owing to the delay in finding relations and getting luggage, I insisted on the whole family concerned leaving the ship.

This, however, did not work as parents, rather than land, took to refusing to recognize their own children, although the poor kiddies pleaded with tears not to be left behind alone. It was hard to blame the parents, because they had sold up all their homes, or had been driven out by bandits, and in many cases had only their ticket and no money.

Two women who were thus ordered on shore tried to commit suicide, one by jumping into the sea off the gangway, the other by beating her head in on the deck. A third woman tried to throw her diseased child overboard, and when she was stopped asked me with painful logic whether it was not better to drown one rather than that she and her two other children should also starve.

These incidents were so painful to me I determined on my Home: a true home, where every member of the family, no matter how many, should be kept free, fed free, and medically attended free. I set to work in 1925 in real earnest, and received splendid support from Chinese residents in Malaya and Burmah, the Shipping interests, local firms and the Boarding Houses, and the Home was opened on my 50th birthday, July 1st, 1926.

The first batch of emigrants went in on July 2nd. At first they were nervous and did not understand it, and some refused to go in, but a weary woman with three children went and was delighted, showing her kiddies how to play with the electric light, and a jolly little lad of twelve clinched the matter by asking "Can I lie down here, and nothing to pay?", and he was told "Yes". "Do I have to pay for food"—answer "No"—"Will my diseased hands be cured?" Answer "Yes, and nothing to pay, and you will be sent on to Singapore in any ship and nothing more to pay". When he had taken it all in, he danced about saying "This is No. 1, this truly good", and by degrees all the waverers came in. The lad was ill three weeks, but when he left, he gave me a packet of anti-seasick medicine and some dried fruit to show his gratitude. The home was soon known and parents used now and then to wire enquiries about children from Singapore if, by accident, they were separated.

At a conservative estimate the Home has saved 1,500 to 2,000 human beings a year from becoming beggars.

May the Home long continue and may warm human feelings always be in the hearts of those in whose hands its interests now are!

This institution has carried on uninterruptedly since Sir Meyrick Hewlett's time. The National Quarantine Service at Amoy took over control on July 9, 1932 following an agreement between the British Consul, the shipping companies and the Director of the Service. The good work was much extended and improved when the Amoy Quarantine Station built in 1933 a modern and well equipped structure at Amoy Kang to replace the old building situated in the city.

Medical examination is very strict, and prospective emigrants found suffering from acute or contagious illness are not passed for embarkation. Every emigrant is vaccinated before departure and individual certificates issued. Among the diseases that are specially looked for, and which the health authorities of the immigration coun-

tries pay special attention to, are the following:—Trachoma and other serious eye infections; favus, ringworm and other skin and scalp diseases; leprosy; and of course, communicable diseases, such as cholera, smallpox, etc. In this connection, it may be mentioned that the Straits Settlements government pays particular attention to the presence of early leprosy among immigrants. As a consequence, steps have been taken in Amoy and Swatow to look for signs of early leprosy. The emigrants are now required to strip when examined in the quarantine offices, and anaesthetic patches are searched for on the back, shoulders and buttocks; the ulnar, peroneal and auricular nerves are also examined.

The number of emigrants rejected at Amoy and the diseases for which they were detained and treated (1931-35) are shown in Table IX.

TABLE IX

Cause of rejection	1931	1932	1933	1934	1935	Total
Trachoma	67	33	6	10	24	140
Favus	36	25	18	3	11	93
Ringworm	—	8	3	1	3	15
Scabies	—	—	—	4	10	14
Leprosy	4	—	—	—	4	8
Venereal D.	9	2	—	—	1	12
Morphinism	10	1	—	2	11	24
Smallpox	—	10	—	1	1	12
Chickenpox	3	2	—	1	5	11
Measles	2	—	—	1	1	4
Tuberculosis	22	1	—	—	—	23
Senile debility and deformities	1	6	3	4	1	15
Fevers from any cause	9	3	11	13	100	136
Other skin conditions	—	—	—	—	6	6
 Total	163	91	41	40	178	513

(g) *Procedure of medical inspection of emigrant ships*

During the years in which the National Quarantine Service at Amoy has taken over control of the medical examination of emigrants, a satisfactory procedure has been elaborated. Improvements are being effected continually as a result of increasing experience and closer liaison with the health authorities of immigration countries. Swatow is rapidly being brought into line following the taking over of the port by the national authorities. When the quarantine station at Hoihow on Hainan Island is established under the Wei

Sheng Shu, similar arrangements will be made to deal with the thousands of emigrants who leave yearly for Singapore and other places in the South Seas.

A ship is treated as an emigrant ship when she carries 20 or more deck passengers, and the voyage from a Chinese port to a foreign country takes more than 48 hours to complete. This definition applies to vessels leaving Amoy and Swatow for such immigration centres as the Philippines, Netherlands Indies, Siam, Indo-China and Malaya.

Inspection of crew.—The crew, as a rule, are lined up on the foredeck in departmental groups, namely, engine crew, sailors, compradore staff, etc. They are first inspected by the quarantine officer. The number must coincide with the crew list signed by the captain. The crew must show evidence of vaccination within one year and must be free from acute infectious diseases, eye and skin infections, such as trachoma, favus, ringworm, scabies, which may be transmitted to passengers during the voyage. Any member of the crew who is found suffering from any such disease will not be allowed to proceed with the ship unless the ship's surgeon guarantees to look after the case.

Inspection of passengers.—A good light is essential. Passengers either walk in single file past the quarantine officer or are lined up in two rows on the upper deck. Before the days of the National Quarantine Service, it was compulsory for emigrants to strip to the waist. (As a result, not a few cases of pneumonia and bronchitis occurred). Experience has proved that this exposure is unnecessary even in the cause of efficiency.

The emigrant removes his hat and exposes his left forearm while the right hand holds out his certificate of vaccination and passage ticket. The officer examines the scalp for scalp affections and the forearm for signs of recent vaccination. The sense of touch becomes very acute after years of experience, and a feeling of heat associated with a flushed face usually indicates a case of fever, to be confirmed or otherwise by a thermometer in the axilla. If fever is present, a more detailed examination is made, for example, search of the body for eruptions, palpation of the groin and axilla for buboes, and testing for rigidity of the neck to exclude cerebro-spinal meningitis. This process of elimination has to be performed as speedily and as thoroughly as possible for obvious reasons.

The power of observation, backed by definite knowledge of the acute eruptive fevers, plays an important part in the medical

examination of emigrants. We have on record several instances of cases of chickenpox, vaccinia and secondary syphilides being diagnosed and treated as smallpox, and isolated dry patches of psoriasis mistaken for leprosy by immigration medical officers. Such errors in diagnosis often lead to serious consequences, such as severe financial losses to shipping companies, and unnecessary hardship to passengers.

Cabin passengers are usually seen in the saloon, and unless smallpox is prevalent at the port of embarkation and unless it is required by the immigration authorities at the port of arrival, vaccination is not compulsory. It is just as important here to exclude the major infectious diseases.

7. CONCLUSION

Throughout the ages there have been movements of peoples—mass migrations sometimes that have altered the face of the earth and made history as it is known today. It is the inherent quality of the human race that it is never static: evolution goes on as inevitably as the earth moves round the sun. Progress has not always been forward; in the panorama of time, there have appeared sinister forces forever pulling backwards, cataclysms counter-balancing the benevolent influences of Nature. Yet, viewed in the right perspective, the dynamic character of the human race tends to exert itself towards a goal of light, towards an easing of burdens, a levelling of class consciousness and an awakening to the essential oneness of all human life free from race prejudice and economic rivalry. It is true we see little of this movement in our present-day world, with its worship of might and gold, its racial conflicts, its international rivalries, and the pettiness of many of its rulers. But the current retrograde phase in the mighty drama of human existence will, and must, vanish. It is inconceivable that the puny efforts of renegade men could resist for long the inertia of the human race moving ever forward and upward to perfection on earth.

In our survey, we have roamed over vast periods of time; the continents of the earth have been our field. We have sketched the early migrations of primitive man, the motives that prompted him to leave his home in frail craft, braving unimaginable terrors, to seek new pastures. We have traced the influence of new modes of communication, and of religious, economic and racial factors in the transplanting of vast numbers of Europeans to the rich soil of the New World. As the movement reached great proportions, threatening the livelihood and social status of the populations that were first on the field, the governments of these new territories

began to enact legislation designed to limit the numbers, as well as the types, of immigrants. New controversies arose as races clashed with each other; the evil of man's inhumanity to man reared its head in a dozen countries. The strong oppressed the weak, and there was no redress. All the viciousness, the greed and the blackness latent in men's hearts came out in a flood of oppression that threatened to sweep away everything that was fine in human nature. Here and there we come across noble administrators, and policies that breed gratitude in the hearts of adventurers who seek an honest livelihood in strange lands.

In our survey we dealt with the history and scope of Chinese emigration, the causes that impelled Chinese farmers to leave their native hearth to brave the terrors of the "four seas," the methods by which they accomplished their object, and the relations obtaining between China and the countries which receive her sons. We sketched briefly the environment from which Chinese emigrants are derived, and attempted to tell of the struggles and achievements of those who settled in foreign lands. Finally, we brought the whole subject up-to-date by a discussion of the emigration situation as it is today, of the part played by the National Quarantine Service, and of the measures undertaken for the health and welfare of emigrants who leave the shores of South China to work in mines, plantations, shops, offices and markets in the tropical regions of Asia.

Two thoughts arise in our mind as we look back over the vista of the years. The first is that Chinese will continue to leave their native land in large numbers so long as the world requires cheap and efficient labour for its industries (in spite of restrictions and racial and economic jealousies), and so long as the mother country is over-congested and not self-sufficient.

The second thought arises when we contemplate the trials and tribulations to which oversea Chinese have been subjected since the first large-scale migrations of the Ming dynasty. It is required of settlers in a foreign land that they conform to its laws and live peaceably side by side with the natives of the soil. With rare exceptions, the Chinese have been model colonists, living frugally, trading honestly, and law-abiding. Yet history records mass persecutions, massacres, innumerable insults, forceful ejections. Why is this? We can only give one satisfactory answer. Though the emigrants have been hardy, strong and law-abiding, they have had little or no effective support, until recently, from their home government. Their persecutors have been only too well aware of the weakness of China, her disunity, her loss of prestige and her con-

sequent inability to enforce respect for her nationals abroad. Unless and until China is a strong nation, gaining the respect of the world not only by her achievements in the arts of peace (for which she is an acknowledged leader of true civilization) but by the power of her own right arm, her overseas sons will continue to exist under severe handicaps, a prey to the whims of some colonial administrator or the considered policy of colonial governments. It is a welcome sign that the present National Government has achieved remarkable progress and unity of the nation since it came into power. Its prestige has increased in proportion as it has shown its ability to put its own house in order and defend its vital interests abroad. The future, therefore, is bright with promise. The day will dawn when this great Republic will secure for her citizens, both at home and abroad, the respect that is due to the heirs of the world's oldest existing civilization.

TEMPERATURE, HUMIDITY AND HEALTH

BY J. W. H. CHUN (陳永漢)

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A Californian is credited with the statement that if one were to eliminate health and weather from conversation, two-thirds of the nation would be tongue-tied. Since these subjects provoke so much interest, it was thought that a concise account of the way in which weather conditions affect bodily health may not be out of place. In fact, it may even clear up some obscure points and misconceptions. For illustration a choice example, culled from the columns of a local newspaper, is reproduced below:—

Those who remember the science lessons at school will recall that most air contains a certain percentage of moisture, and that should the amount rise about the maximum percentage, condensation results. That accounts for "perspiring" walls and floors.

This phenomenon goes under the name of absolute humidity, and varies with the month. The absolute humidity for any one month, however, will more or less correspond to that of the same month in any preceding year, and may therefore be defined as a constant.

It is the effect of the relative humidity of the air, however, that is felt—relative, that is, to the temperature. The humidity of the air of any two days may be practically identical, yet it will be felt more on the cooler day of the two, due to the fact that the cooling effect of perspiration is lost to a greater degree.

Relatively speaking, Shanghai, in common with most other Far Eastern cities, has a greater amount of humidity, and due to the fact that the amount of moisture in the air is greater relative to the humidity, changes in the weather are felt more here than in cities in other parts of the world whose temperature is equal to, or even higher than, Shanghai's.

This is, however, nothing out of the ordinary, and rumours that this has been an unusual year for humidity may be discounted. The effect has, it is true, been felt more, but that is because the corresponding temperatures last year, for instance, were much higher. A call at Sicawei Observatory yesterday, however, elicited the fact that the percentage of absolute humidity of the air has only varied infinitesimally from the figures for 1934.

RELATION BETWEEN TEMPERATURE AND HUMIDITY

The temperature of the air depends mainly upon solar and terrestrial radiation. The air absorbs vast quantities of heat from the sun and, as the heat of the earth is radiated into space, a certain amount is again absorbed by the atmosphere. Accordingly, the air both keeps the heat out and keeps it in. In this way it makes the days cooler and the nights warmer. "It is a parasol at

noon and a blanket at night." Except for this there would be much more violent changes in temperature.

This property of the air is due to the presence of water vapour in the form of invisible moisture which is opaque to heat rays. The amount of water vapour present in the atmosphere depends entirely upon the temperature. At 32°F., for instance, the air can "hold" 1/160 of its weight of water vapour, at 59°F. 1/80 of its weight, at 86°F. 1/40 of its weight. Neglecting the comparatively small effect of the barometric variation, the weight of vapour at saturation, expressed as a mass-ratio, i.e., in grains of water per lb. of dry air, is found to be as follows:—

At 30°F.,	it is 25	grs. of vapour per lb. of air.
„ 48°F.,	„ 50	„ „ „
„ 67°F.,	„ 100	„ „ „
„ 87½°F.,	„ 200	„ „ „
„ 94½°F.,	„ 250	„ „ „
„ 130°F.,	„ 774	„ „ „

These figures represent the maximum amount of vapour which can be present in the air at the different temperatures. The actual amount present, irrespective of temperature, is known as the Absolute Humidity. Absolute Humidity, then, is the mass of water vapour present in the atmosphere measured as grains per pound or grams per cubic metre. It is sometimes expressed as aqueous vapour pressure in inches or millimetres of mercury. If a drop of water is placed in a vacuum, say in a barometer tube, some of the water vaporizes and the mercury is depressed, owing to the tension of the water vapour. In the same way, water vapour in the air, in conformity with general laws which govern gases, exerts tension or pressure. The amount that evaporates, as well as the tension exerted by the vapour, depends upon the temperature. As shown by the author (1933), the absolute humidity, expressed as vapour tension in terms of mercury, and the atmospheric temperature, tend to follow each other quite closely.

When the water vapour in the air is not at saturation point, the ratio of the amount actually present to the amount required for saturation is the Relative Humidity, usually expressed as a percentage. In other words, the Relative Humidity is the ratio of the quantity of water vapour present in the atmosphere to the quantity which would saturate it at the existing temperature.

When the air is cooled, its capacity for holding moisture is reduced. If it originally contains less than its saturation amount, a certain temperature will be reached at which its capacity for holding moisture is equal to the amount of vapour present. A further drop of temperature will reduce its capacity below the

amount present, and the excess vapour will be condensed as a cloud or precipitated as rain. The temperature at which this condensation occurs is known as Dew Point, or Saturation Temperature. Conversely, if air is heated, its capacity for holding moisture increases. If no additional vapour is available, the amount present becomes a decreasing percentage of the saturation amount and the air becomes drier (relatively). Thus, air at 30°F. will be saturated when it contains 25 grs. of water per lb. of dry air; its absolute humidity is 25 grs./lb., and its relative humidity is 100 per cent. If without adding moisture its temperature is raised to 130°F., at which temperature it would be saturated with 774 grs./lb., its absolute humidity remains unchanged at 25 grs./lb., but its relative humidity is reduced to 25/774 or 3.23 per cent.

In meteorological tables, giving climatic particulars of any town or locality, the relative humidity is usually stated; but it should be noticed that the relative humidity bears no constant relationship to the absolute humidity. Further, as the relative humidity varies greatly throughout the day and as the readings are not always taken at the same time of day in different localities, it at once becomes evident that great caution must be taken when evaluating relative humidity figures. For instance, in Shanghai the relative humidity on a day in July may decrease from 98 per cent at 4 a.m. when the atmospheric temperature is lower, to 57 per cent at 4 p.m. when the temperature is higher. The reason for this change has already been given.

The relative humidity is of great practical importance as it is a measure of the hygroscopic or drying power of the air, the capacity of the air for absorbing additional moisture. It is conveniently measured by the wet and dry bulb psychrometer, which consists of two thermometers, the bulb of one of which is bare and dry, while the other is covered with a moist muslin jacket. Evaporation takes place from the wet bulb, and the latent heat of evaporation is withdrawn from the mercury. The drier the air, the more rapid the evaporation and the greater the depression of the wet bulb reading below that of the dry bulb. When the air is saturated, no evaporation takes place, and the readings are identical.

From the foregoing, it is clear that any given sample of air has five qualities which are interdependent, namely, dry bulb temperature, wet bulb temperature, dew point, absolute humidity and relative humidity. Their relationship can be ascertained from psychometric charts or hydrometric tables (Glaisher's or those in the U.S. Weather Bureau, Bulletin No. 235).

EFFECT OF TEMPERATURE AND HUMIDITY ON MAN

In a general way it may be said that moist air is depressing and enervating, while dry air is tonic and stimulating; also that cold air is tonic, while warm air is depressing. Metabolism is slowed in warm air and quickened in cold air. Certain combinations of heat and humidity are trying or even hurtful; the most mischievous combinations are cold damp air and warm moist air, also an excessively dry air, especially when artificially warmed. The human body, however, can adapt itself to wide variations in heat and humidity, and by means of suitable clothing and food the range may be greatly increased.

In considering the effect of climate on people, the results of researches in America indicate that the physiological effects of climate depend on three factors, namely, dry bulb temperatures, wet bulb temperatures, and air motion, i.e. temperature, humidity and wind velocity. This is in accord with daily experience. For instance, a visit to a Turkish bath will prove that whereas a temperature of 140°F. can be tolerated in the dry room, a temperature of 88°F. in the steam room is about the highest that can be borne. As regards air motion, the cooling effect of a fan or punkah is also well known, although it cannot appreciably change either temperature or humidity.

The temperature and humidity of the air affect health mainly by influencing the heat-regulating mechanism of the body. More heat is reproduced within the body by metabolism than is required, hence heat must be lost, or else heat stagnation or heat stroke will result. As expressed so succinctly by the common saying, "it isn't the heat, it's the humidity," the temperature of the air, but still more its humidity, influences heat loss. More than that, excessive moisture makes hot air feel hotter and cold air colder—the first by hindering evaporation and the second by favouring conduction. Heat is lost from the body firstly by radiation, conduction and convection, controlled by changes in the dilatation and contraction of the blood vessels of the skin, secondly by evaporation, chiefly by the evaporation of the water of perspiration, controlled by the varying activity of the sweat glands, and thirdly by the expelling of heated moist air in respiration.

The human body contains a remarkably sensitive heat control mechanism in the brain to compensate external conditions, and maintain an approximately constant body temperature; the variation in ordinary health is less than 1°F. It operates by maintaining a balance between the generation of heat by the oxidation of food substances in the muscles, and the dissipation of heat partly by

expelling heated moist air in respiration, but more particularly by evaporation through the skin. Radiation, conduction and convection losses from the body are not to the same degree under the control of the body but depend on temperature differences, and the amount of insulation in the form of clothing. The chief process of heat loss is by evaporation. As the outside temperature rises, the "thermostatic" control in the brain excites the sweat glands to increased activity. The production of perspiration is, however, only a part of the process; it has still to be evaporated, and it is by the absorption of the latent heat of evaporation which cools the surface of the body. The rate of evaporation depends chiefly on the relative humidity of the air. The drier the air the more rapid the evaporation.

There is a popular belief that people perspire more in humid climates than in dry. This is more apparent than real. For instance, people say that in Lahore with a temperature of 118°F. they perspire less than in Calcutta with 89°F. The reason is that the low humidity (20 per cent) in Lahore allows the perspiration to dry off and cool the skin, whereas in Calcutta, the humidity of 90 per cent prevents rapid evaporation, so that the moisture lies on the body and soaks the clothes. The effective temperature for still air, taking into account as it does all the qualities which affect the body temperature control would, in the two cases, be about 89½°F. for Lahore and 88°F. for Calcutta, which shows that the degree of comfort at the two places is not very different.

The American research workers in Pittsburgh have taken as their criterion a quality of the air which they call the Effective Temperature. This is roughly defined as the quality which measures the physiological effects on the human body. Different combinations of temperature, humidity and air motion which feel alike to the body, and have like physiological effects can, within limits, be found. For instance, if the temperature of air at rest is raised, while the humidity is decreased, a certain relation of temperature to humidity can be found which feels the same. Similarly, if the temperature rises, a certain increase in air motion can be found which will balance this. The exact relation depends on the particular person, on the clothing and on the activity of the person, and the effective temperature lines on the chart vary according to these factors, i.e. clothing, heat output and air motion.

It would simplify matters by considering the problem of average human beings normally clothed in still air. There are more or less recognized standards of ventilation for sedentary individuals in England and in the United States of America (Hill and Campbell, 1925). The comfort standards for the two countries differ considerably. Thus

in England, the temperature required is about 60°F. and the relative humidity 45-60 per cent.; whilst in America the temperature is usually at least 70°F., and the relative humidity 25-60 per cent. Rosenau (1923) stated:—

The so-called "comfort zone" has a maximum temperature, 70°F., a minimum humidity 30 per cent.; a minimum 55 to 60°F. and a maximum humidity, 55 per cent. This is the range which most people in temperate climates find agreeable. However, large numbers of people remain comfortable and well in climates that would be trying if the change were made suddenly. The body possesses great powers of adaptability in this regard, which is one of the factors in acclimatization.

Another authority (Faber, 1933) stated that by taking the personal feelings of various subjects in researches in America, the "comfort line" (most comfortable effective temperature) has been established at about 64°F. for persons normally clothed at rest, and 53° for persons normally clothed at work. This is for American conditions. The tolerance appears to be about 11° above and 7° below this. The comfort line for persons at rest is shown on Chart I.

The conditions are, however, not always so definite. The temperature in a room should depend to some extent on the outside temperature, especially where people enter and leave frequently, to minimize the shock due to the sudden change. Within certain limits, a mere reduction of humidity alone will give a sufficient feeling of invigoration, while a too great temperature difference will cause discomfort particularly when leaving. The humidity also should not be too low; medical authorities recommend a range between 55 per cent and 75 per cent at ordinary temperatures with optimum about 65 per cent. The best effective temperature in different cases will vary considerably. For temperatures around 90° with high humidity, the best conditions seem to be to have a dry bulb temperature drop of 5°, humidity of 60-65, and an air velocity of about four feet per second. This means an effective temperature of about 74°, which is considerably higher than the comfort lines quoted for America (see Chart I).

According to Rosenau, the amount of moisture in the air conducive to health and well-being is often stated to be somewhere between 50 and 75 per cent relative humidity. These figures may be very misleading. There is no such thing as a normal humidity, for the amount of moisture in relation to health depends upon the temperature, clothing, motion of air; also upon diet, muscular activity and other factors. Neither the relative humidity nor the absolute humidity nor the temperature of the air alone is a satisfactory guide as to its condition in relation to health. One factor alone gives the sanitarian but scant information; however, the temperature as registered upon the wet-bulb thermometer is most significant. Practically all authorities agree with Haldane that the air of workrooms should not exceed 70°F.

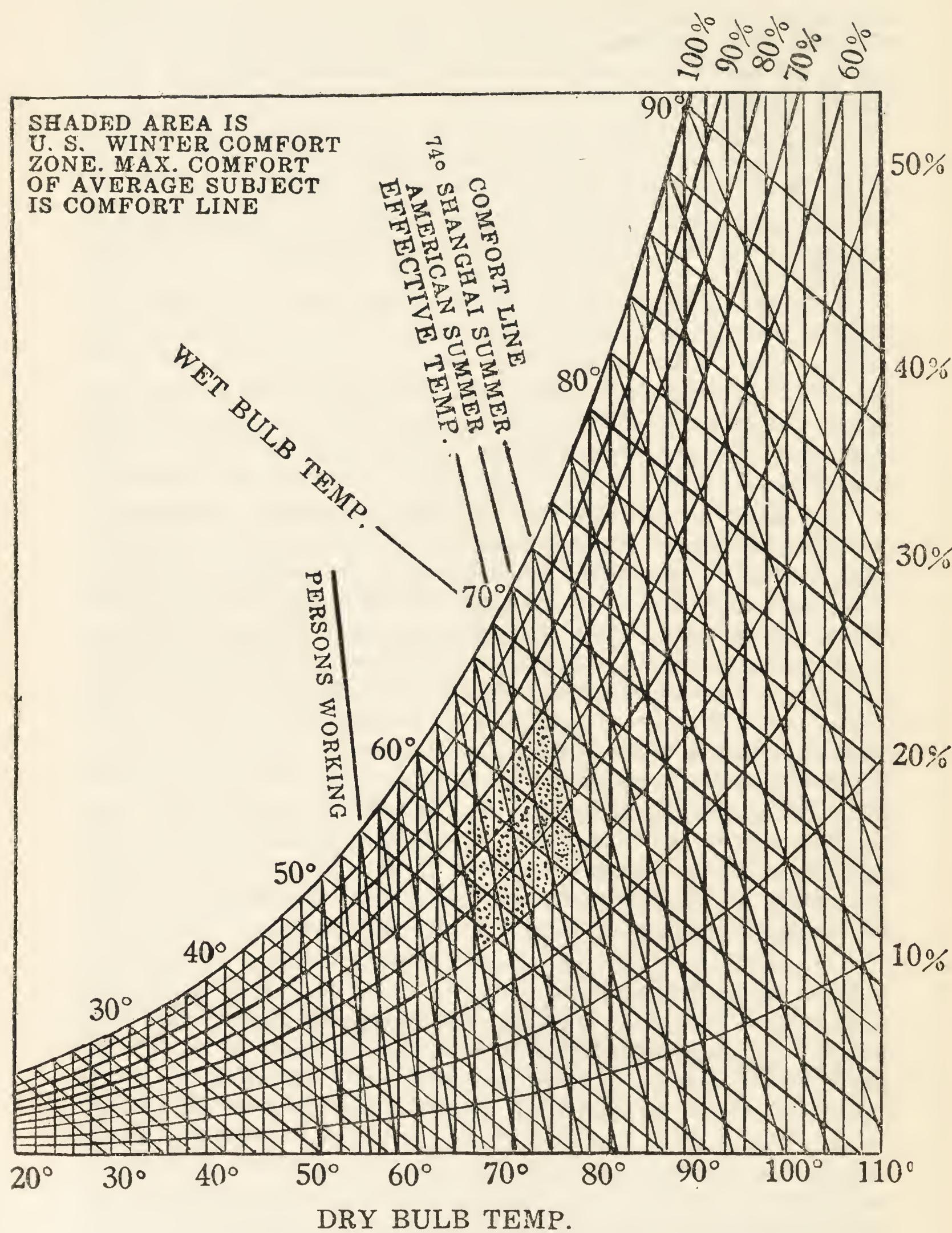


CHART I. Psychrometric chart showing effective temperatures for human beings normally clothed at rest in still air. Courtesy of F. E. Faber.

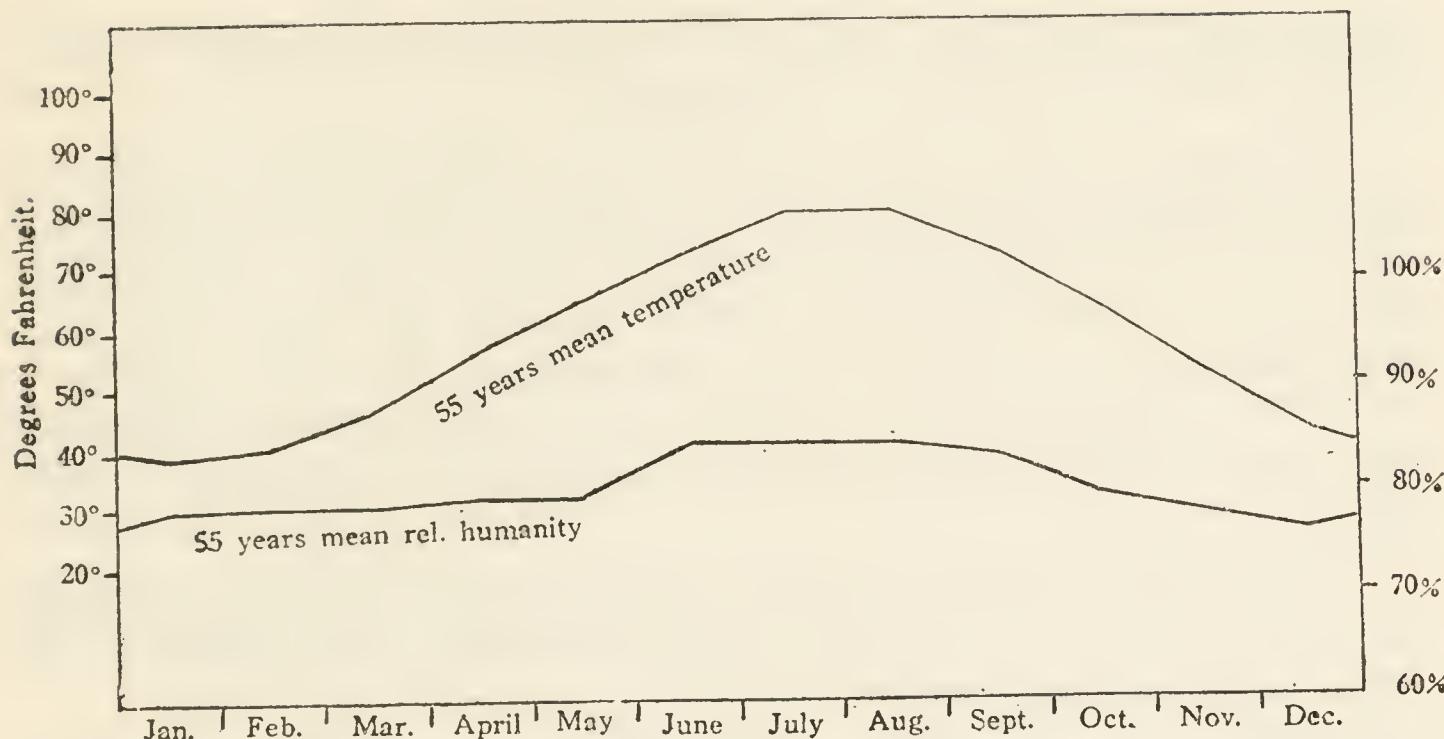


CHART II. Monthly Mean Temperatures and Rel. Humidity.
From 1873 to 1927 incl.

by the wet-bulb thermometer. Haldane places maximum comfort for men at 68° wet bulb, while actual distress symptoms occur at 78° wet bulb.

It was recognized that the mere observation of the temperature of the air in a room by an ordinary dry-bulb thermometer is no index of comfort, and gives no measure of the amount of rate of loss of body heat in it. The thermometer measures the degree and not the quantity of heat. It gives no measure of radiation, or of humidity, of drying or cooling power exerted on the skin.

To overcome this, Leonard Hill (1919) used the kata-thermometer, which consists of special wet and dry-bulb alcoholic thermometers, and laid importance upon the time required to cool the wet-bulb thermometer from 100° to 95°F. In this way, the cooling power of the air may be determined and expressed as a factor. In order that the rate of heat loss may be expressed in heat units, the total heat loss, while cooling between 100° to 95°F., is determined for each instrument by the maker. The figure thus obtained is marked on the back of the stem and is known as the "factor" of the instrument; the rate of heat loss is at once obtained by dividing this figure by the time in seconds of cooling over the same range of temperature. The kata-thermometer outfit as first proposed by Hill consisted of two specially constructed thermometers with large bulbs and stems graduated from 86° to 110°F., one to be used as a dry and the other as a wet-bulb thermometer. The bulbs are heated to about 110° and then placed in clips which hold them in horizontal position, after drying the bare bulb on a clean cloth and jerking excess moisture

off the silk covered one. The time taken to fall from 100° to 90°F. is then noted by the use of a stop-watch.

The rate of fall of both thermometers will obviously be affected by air movement and radiant heat as well as by air temperature, and that of the wet bulb by the humidity of the air also. Hill believes that the combined influence of these factors will affect the kata-thermometers very much as it does the human body, and suggests a 45 to 60 second period for the wet bulb and a 150 to 180 second period for the dry bulb as limits for comfortable atmospheric conditions.

Since Hill's invention, several improvements have been made and one of the latest is the electric kata-thermometer, and another is the recording kata-thermometer.

Very many observations with the kata-thermometer show that under ordinary indoor conditions a dry kata-thermometer cooling power of 6 is required for comfort and efficiency during sedentary work, that is with the temperature between 60° and 70°F., and 7 to 8 above 70°F. A cooling power of 10 is common in sanatoria wards with open windows. Given a warm floor such high cooling power is found excellent for schools. The following table (Hill and Campbell 19252) gives examples of thermometer and kata-thermometer readings selected from many hundreds taken in workrooms:—

<i>Dry kata</i>	<i>Wet kata</i>	<i>Dry bulb</i>	
8.5	26.0	54.5°F.	Winter day, sedentary workers, too cold for comfort.
6.0	18-20	63.0	Sedentary workers, comfortable conditions.
8-12	22-26	65.0	Cross-circulation with hopper windows on cool summer day, excellent conditions for fairly hard work done in factory.
3.0	13.0	82.5	Warm summer day, serrated roofed one-story factory, enervating conditions, fans required to blow air on workers.

In the tropics, with the air in the shade above 95°F., the dry kata-thermometer cannot be used to measure cooling power, but when the air is above 100°F. the kata-thermometer can be cooled and the heating power of the air measured by this means. The wet kata-thermometer is of particular value in warm atmospheres, e.g. in the tropics, cotton mills, mines, etc., where sweating comes into play.

MODIFICATION OF CLIMATIC CONDITIONS

Mark Twain's famous saying to the effect that everybody talks about the weather but no one does anything about it, does not hold

good any more, for nowadays engineers have made air conditioning an exact science, and are able to create in buildings a cool atmosphere in summer and a warm one in winter.

Enough has been said to show that in order to supply an ideal climate, corrections will usually have to be made on all three qualities of the air, viz. temperature, humidity and air motion.

Temperature.—It is sufficiently obvious that one must have means of lowering the temperature in summer and of raising it in winter. This is commonly accomplished by supplying either hot or cold water surfaces in contact with the air which is to be pumped through the building. Economy in operation is achieved by recirculating part of the air after due washing and conditioning.

The most pleasant form of heating is radiant heat, such as from an ordinary coal fire, electric radiator, or gas fire. The reason for this is that the radiation leaves the air unwarmed, while heating the body. As a consequence the relative humidity of the air is not reduced to any appreciable extent. The control of the humidity is, however, impossible by these methods, and in any case they are uneconomical for large buildings.

Humidity.—It has been pointed out that at high temperatures, a considerable de-humidification is desirable. In winter, when the air is heated, an increase of moisture is required, although this fact is frequently overlooked. If the outside air in January has a D.B. temperature of 30°F. and a relative humidity of 50 per cent, the effect of merely increasing its temperature (as for instance by hot water "radiators") to a D.B. temperature of 70°F. is to reduce its relative humidity to about 12, which is too dry for comfort, causing the well-known and objectionable shrinkage of timber in "central-heated" rooms. The practice of maintaining dishes of water on radiators and stoves is a well-known recognition and palliative of this "dryness." The quantity of additional water needed is of course partly provided by evaporation from the occupants of the room, but a great deal more than this is needed. As an example, consider a room 25 feet long, 15 feet wide and 11 feet high, i.e. with a cubic capacity of 4,125 cu. ft. Let the outside air be taken at 35° D.B. and 60 per cent humidity, and let 70° D.B. and 62 per cent humidity be specified for the final inside conditions. The moisture which a lb. of dry air can contain at 35° and 60 per cent is about 18 grain, and at 70° and 62 per cent about 58 grs., an increase of 40 grs. per lb., which is (at 70°) about 2.95 grs. additional vapour per cu. ft. of moist air. For each air change, therefore, 15,000 grs. of moisture, or about $\frac{1}{4}$ U.S. gallons will have to be added. In summer, if the outside air is taken at 90° D.B. and 80 per cent humidity, and the inside

conditions specified are 80° D.B. and 65, the amount of dehumidification needed is about 74 grs. of water per lb. of dry air, which at these higher temperatures is about 5.3 grs. of water per cu. ft.

Air Motion.—The air motion will vary from the minimum, in winter, necessary to maintain a sufficient supply of fresh air, to a maximum, in summer, to reduce the effective temperature in conjunction with the other methods of cooling.

The corrections required may thus be broadly stated as heating and humidification in winter, and cooling and drying in summer, with such additional air motion as may be suitable, depending on the exact use to which the room is to be put. In general, modern methods of air conditioning a building rely mainly on the provision of a central conditioning plant with air ducts to distribute the air properly so that all parts receive an adequate and proper supply, and return ducts to permit of recirculation, with dampers to control flow. The central plant must be capable of either raising or lowering the temperature, increasing or decreasing the humidity, and of providing an air flow to circulate the air through the building. Such plants consist essentially of an inlet connected to atmosphere from which the requisite volume of fresh air is drawn, a tempering battery, an air washer, a reheated battery and a fan, coupled to the supply duct, with recirculation ducts, as well as the necessary heating boilers and refrigerating machines. Ozonizers may in some cases be fitted in addition.

The tempering battery may either heat or cool the air, and consists of a large air duct with coils through which cold brine, or hot water or steam may be passed. The air washer consists essentially of a chamber where the air passes through a series of water sprays from atomizers, through which water is forced, forming a fine mist, thus increasing the humidity of the air, and heating or cooling it. The jets are arranged so that the velocity of the spray assists in moving the air. Eliminators, consisting of baffle plates to trap and retain excess water mist, follow the sprays. The reheated battery which is similar to the tempering battery is to bring the air, now properly humidified or dried, to its correct temperature.

In winter, hot water or steam is passed through the tempering battery, which by contact with the air raises its temperature. The warmed air is then passed through the water sprays and becomes saturated, passes through the baffle plates which catch the surplus spray, and with it dust and dirt, and is then brought back to its proper temperature in the reheater. The actual amount of heat and water to be supplied will depend upon many factors, such as the

outside conditions, the specified inside conditions, the proportion of recirculated to fresh air, the heat losses from the building, the amount of reheating which can take place in the supply ducts, and the heat and moisture output of the occupants of the building. All these have to be known to enable accurate calculations to be made; in any event, considerable range of control is desirable to allow for variations in these factors. Such are the general principles which govern air conditioning and it is not proposed here to go into details or minute descriptions.

Before concluding, mention may be made, as an example of poor ventilation and heating, of the method formerly employed in the House of Commons, London. 20,000 to 40,000 cu. ft. of air per minute were forced through the perforated floor of the Chamber. The velocity of the incoming air, heated to 63°F., cooled the feet and legs of the members by sweeping over or through their footgear and trousers. The lower part of the body became chilled while the mucous membrane of the nose became congested and swollen and a "stuffy" feeling in the head was induced. Kata-thermometer readings showed that the cooling power was 50 per cent greater at the feet than at the head level. Experiments proved that if the air was impelled into the Chamber from the level of the gallery and above the head-level the feet were kept warm whilst the head was cooled. Such a method was taken up by H.M. Office of Works in 1925.

The author desires to record his grateful acknowledgment to the following authorities whose work has been freely quoted: M. J. Rosenau: "Preventive Medicine and Hygiene"; S. E. Faber: "Air Conditioning" (Proceedings of the Engineering Society of China); and L. Hill and A. Campbell: "Health and Environment".

REFERENCES

CHUN, J. W. H. (1933): Nat. Quarant. Serv. Rep. **4** 87.

FABER, S. E. (1933): Proceedings of The Engineering Society of China. **30**, **31**, 76.

HILL, LEONARD (1919): The science of ventilation and the open air treatment. Special Report Series No. 32. National Health Insurance, Medical Research Council, H.M. Stationery Office.

HILL, LEONARD & CAMPBELL, ARGYLL (1925): (1) Health and Environment. Edward Arnold & Co., London, 37. (2) *Ibid.*, 43.

ROSENAU, MILTON J. (1923): Prevent. Med. & Hyg., D. Appleton & Co. N.Y. & London, 905.

SOME MODERN TRENDS IN PLAGUE WORK*

BY C. Y. WU (伍長耀)

I. DIAGNOSTIC METHODS

(a) *Examination of the Bone-marrow*

The history of plague is a long one. The impressive array of literature on this most fascinating of diseases contains nothing more painstaking than the records of laboratory researches since the discovery of the causative organism in 1894. Our present firmer understanding of the problem is, however, marred by the knowledge that although the plague *pasteurella in pure culture* can be easily identified, it is quite a different story when we have to deal with carcasses or dead bodies which have undergone putrefaction. We rather suspect that the organism is one of those aristocratic snobs who refuse to spread or even show themselves when thrown into the contaminating company of the vulgar crowd. It is true that often infection of guinea-pigs by the percutaneous method proves helpful in cases where smears and cultures fail altogether. The time factor may, however, prove important, as in the case of discovery of putrefied rats on board a ship when the momentous decision as to whether or not free pratique should be granted by the quarantine authorities may depend upon laboratory diagnosis.

It is therefore reassuring to know that in recent years a technique has been elaborated whereby a reliable diagnosis may be quickly made by an examination of the *bone-marrow*. This new method was introduced by PONS in 1926, following investigations conducted by veterinarians upon infections in birds.

Examining experimentally plague-infected guinea-pigs at various intervals after death up to a limit of 72 hours, PONS obtained pure or only slightly contaminated growths from the bone-marrow of the humerus in animals, the liver and buboes of which had become unsatisfactory. Identically favourable results were reached at autopsies of human plague victims, where the bone-marrow of the lower ribs proved both easily procurable and fully reliable.

The value of this method has been endorsed by quite a number of experts working in different foci and there can be no doubt that it

*Lecture (illustrated with lantern slides) delivered at the Henry Lester Institute of Medical Research, Shanghai, on January 6, 1937.

should be considered as one of the routine methods in practical plague work.* MICHELETTI found that even *smears* taken from the bone-marrow of putrefied rats often proved positive, thus making it possible to obtain valuable *prima facie* evidence in certain emergencies.

(b) *Examination of Fleas*

Although examination of the bone-marrow undoubtedly marks a distinct forward step in the laboratory diagnosis of plague, it shares the limited applicability of the methods previously used for the examination of plague rodents. To put it more clearly, the problem often centres in the difficulty of securing the requisite animals for study rather than in the technique to be adopted. I may quote a concrete example. When the staff of the Manchurian Plague Prevention Service commenced work in the Tungliao area of South Manchuria in the autumn of 1928, a definite bacteriological diagnosis was rapidly arrived at by the examination of human victims and of fleas caught in the infected houses. There was every reason to believe that the outbreak was rat-caused: Numerous rat holes could be seen in the huts of the inhabitants who stated that rats which had been frequent before the outbreak had completely disappeared during its course. In fact, it was impossible at first to find any dead rats or trap live ones. Bounties were offered but they merely encouraged an ingenious form of swindle: The attractive rewards secured us a number of live rats, found quite normal, that had been trapped in houses well away from the focus of infection. It was perhaps due to good luck as much as to persistence that we were finally able to procure some positive rats, for quite a number of instances are on record where workers, reaching—as we did—a focus only after the appearance of human plague, failed entirely to find evidence of an epizootic. In fact, a glance through recent plague literature may give some an idea that the virus may be perpetuated, to the exclusion of rodents, by agencies like human patients or even carriers and human parasites. There is no definite evidence to support such views. In fact, rodent plague has not infrequently been found later in endemic areas for which at first such claims have been made. It is clear, however, that our usefulness would be rather limited, if we had to wait until some lucky chance brought plague-infected rodents to our laboratory. Fortunately, pioneers like KITASATO and the Indian Plague Research Commission, as well as later workers, have found that in instances where infected rodents were scarce or apparently altogether absent, it was comparatively easy to collect plague-infected fleas for adequate examination. This method was used on a very large scale by SWEL-

* URIARTE recently attested to the reliability of this method, even in the case of putrefied rats that reached the laboratory after several days' transit.

LENGREBEL & HOESEN in Java who, in order to demonstrate plague in large numbers of fleas, resorted to infection of laboratory animals with emulsions prepared from lots of pooled fleas.

Until recently the last-mentioned procedure alone was considered when dealing with numerous fleas. A few authors, however, now maintain that satisfactorily rapid results may also be obtained when cultivations are made from the stomachs of fleas dissected out in a suitable manner. BICHKOV and his collaborators have demonstrated that with their technique hundreds of fleas can be examined in a day. Those showing evidence of blockage (dark and enlarged proventriculus with atonic walls) may then be dealt with individually whilst the gastro-intestinal contents of the others are pooled for cultivation. Though such methods are invaluable for research work, it remains to be seen how far they may supersede animal experiments in anti-plague campaigns. Apart from the time factor, the average worker has to reach the requisite degree of skill in flea dissection if this method is to be of any real practical value in the field.

Whatever method is chosen when working with fleas, it is always necessary to determine their species before proceeding to the tests. This task is easy when handling wild rodent fleas, as has been done recently on a large scale in California and adjacent states of North America where by the flea method a number of rodents and localities hitherto unsuspected has been incriminated. But it is not quite so simple where a distinction between *P. irritans* and *X. cheopis* comes into question, the more so as one has obviously to work with unclarified specimens.

II. THE PROBLEM OF INFECTED AND INFECTIVE FLEAS

As proved by numerous allusions to the flea in literature and art, man has for a long time been well aware of his involuntary companionship with this insect which is no respecter of sex, age or dignity, giving rise to embarrassment to kings and beggars alike. It is only during the past forty years, however, that this pest has emerged from its apparently harmless, if annoying, role to play a decisive part in plague epidemiology.

Though early investigators, such as OGATA in Formosa in 1897, SIMOND, TIDSWELL, VERJBITZKI, THOMPSON and LISTON had adduced evidence as to the causal role of the flea in plague, we are indebted to the Indian Plague Research Commission for a thorough investigation of this problem, as a result of which the paramount importance of the Indian rat-flea, *X. cheopis*, in transmission of the infection not only from rat to rat, but also from rat to man, has been definitely established. The Commission considered various possible modes of

transmission, laying stress on infection of the wound (produced by the pricker of the flea) through infected faeces deposited by the insects during the act of biting.* Infection by contaminated mouth parts or by regurgitation from the stomach was considered as less likely.

Whilst most of the conclusions reached by the Commission have remained valid, a revision of their views on the mechanism of infection has become necessary. As demonstrated by the work of BACOT and MARTIN, the multiplication of the bacilli in the gastro-intestinal tract of the fleas may reach a stage leading to blockage of the proventriculus. A blocked flea, whilst unable to get nourishment into its stomach, usually makes frantic efforts to suck in blood. A cessation of these efforts brings about an elastic recoil of the pharyngeal and stomach walls which tends to drive highly charged blood into the wound. In partially blocked fleas a specially dangerous condition may exist, a column of infected blood extending from the posterior end of the stomach right into the anterior chamber of the pharyngeal pump.

Building on these foundations the conception was reached that the mere fact of a flea becoming *infected* by sucking plague blood, does not necessarily render it *infective*, i.e. likely to transmit infection. There is no doubt that a plague flea becomes increasingly dangerous as the blockage proceeds. Consequently the greatest importance is attached to the degree of infection that would lead to infectivity, whether this process is inherent in the species involved or due to extrinsic circumstances favouring multiplication of the bacilli in the gastro-intestinal tract of individual fleas. It is evident that these wide variations in the evolution of infection in fleas render it rather difficult to produce plague through the bite of a single flea. Experiments carried out in this respect by the Plague Research Commission in India showed that out of 67 fleas collected from rats (which had succumbed to plague) and exposed individually on healthy guinea-pigs, only one actually transmitted infection. GEORGE and WEBSTER in India hold the view that even under the most favourable conditions only an occasional *infected* flea becomes *infective* (that is, capable of infecting animals or humans). BICHKOV, working recently with the fleas of Transbaikalian wild rodents, found in 61 instances 1-10 fleas, and in 6 instances even 12-40 fleas unable to produce infection of experimental animals. Eight guinea-pigs used in these experiments survived when again infected with 10-40 plague fleas; one month later all eight animals proved immune against a dose of plague bacilli fatal to controls. BICHKOV suggests that even under natural conditions, rodents bitten by infected fleas but not succumbing to plague, might become actively immunized.

* SWELLENGREBEL has shown, however, that fleas do not defaecate when feeding.

Though the evidence upon which this hypothesis is founded does not appear fully substantiated, BICHKOV'S researches certainly tend to confirm earlier work on the important difference between *infected* and *infective* fleas. However, if the danger represented by individual fleas appears thus more limited than was originally believed, it has been shown, on the other hand, by recent researches in India and elsewhere that these insects are not mere *transmitters* of infection but play, side by side with the rodents, an appreciable role in *carrying over* the virus from one plague season to another.

A mass of evidence, based upon extensive field and laboratory investigations, has accumulated in regard to the extraordinary length of life of infected fleas. Russian workers especially, have shown that wild rodent fleas that have been put to feed on plague-infected guinea-pigs and susliks and then buried underground for months, harbour virulent plague bacilli when examined during the non-epizootic season. In India smouldering epizootics, which are a common occurrence, can only be explained by the persistence of infection in rat-fleas which have been proved capable of carrying over plague for more than four weeks even under conditions of starvation.

Excellent progress is also being made in flea research in other directions, e.g. in the bionomics of the various species involved; the influence of meteorological factors in the different plague areas; the spread of plague over widely separated areas through the transportation of fleas in cargo, clothing, grain, cotton, etc. It would be impossible to deal even briefly with these problems in the time at my disposal, but I should like at this stage to give a rough sketch of the conclusions arrived at through our work in China.

III. FLEA INVESTIGATIONS IN CHINA

Previous to 1930, investigations into rat-fleas in this country were not systematized. A few workers like STANLEY and HICKS had conducted restricted surveys in Shanghai but no definite conclusions arose out of their results. Since that year, a systematic investigation has been carried out by the National Quarantine Service and, as a result of the extensive surveys conducted in the important ports of this country, it is now possible to formulate certain conclusions.

In Shanghai alone we have up-to-date examined 19,000 fleas recovered from 4,500 rats. Similarly large numbers have been studied in Hankow, Tientsin, Chinwangtao, Amoy and Canton. Taking the figures as a whole, three species predominate, the relative incidence depending upon the climatic conditions and situation of the various survey zones. The most widespread species is the "mouse flea," *Leptopsylla musculi*, which appears to be an all-season flea. The

northern ports however have shown a remarkable absence of this species. The European rat-flea, *Ceratophyllus fasciatus*, is, strange to say, rarely found in this country. In its place we have identified another species of *Ceratophyllus*, namely *C. anisus*, hitherto missed by previous workers. The Indian rat-flea, *Xenopsylla cheopis*, is very common in Canton, Amoy, South Fukien and North China. In Shanghai and, to a lesser extent, in Hankow, this species is recovered in large numbers only during the late summer and early autumn months.

From a detailed study of the seasonal prevalence and distribution of the commoner species, we have arrived at the following conclusions:

1. Plague is not endemic in Shanghai although limited outbreaks occurred between 1909 and 1915. One of the reasons advanced is the unsuitability of the soil for the breeding of *X. cheopis*. We have found that whereas this flea, which has been responsible for all natural outbreaks of bubonic plague, flourishes only during a limited period in the autumn, the plague season in South China usually falls in the spring. It is unlikely therefore that even if infection were introduced into Shanghai from, say, Fukien, it could spread in the comparative absence of the principal vector. The plague season in North China appears, however, to fall in the autumn months, judging from records of past epidemics. Fortunately, the tendency is for these Northern epidemics to spend their energy at the spot rather than to invade the coastal areas. The danger to Shanghai from the North cannot, however, be completely excluded on account of the rapid evolution of inland communications.

2. Our observations have confirmed the generally accepted view of the close correlation between a high *cheopis* index and plague incidence. For instance, when the *cheopis* index in the South China areas reaches its maximum between May and August, epizootics and epidemics of plague are more liable to break out. In working out the *cheopis* index for a particular region, it is necessary to remember that figures giving the average number of fleas of a particular species per rat really have no absolute value because factors like species, weight and age of the rat-host must always be taken into account.

3. Our investigations into past epidemics in China (including Manchuria) confirm the now universally accepted view that *X. cheopis* is the plague flea *par excellence*. It is still to be seen what role is played by *C. anisus* and *L. musculi* in the causation of limited outbreaks among rodents although most authorities have agreed to throw them into the discard as far as natural epidemics and epizootics are concerned. The human flea, *Pulex irritans*, has been implicated in certain circumscribed outbreaks, but it can never assume the import-

ance that *X. cheopis* has achieved in the epidemiology of this dread disease.

Comparison of rat species in three Shanghai surveys

	STANLEY	HICKS	C. Y. WU
Period of survey	1910	1923-5	1932-6
No. of rats examined	?	1,511	4,500
<i>R. rattus</i>	70%	72.8%	85.5% (inc. <i>R. alex.</i> & <i>frug.</i>)
<i>R. norvegicus</i>	30%	27.2%	13.02%
Other species	—	—	1.48% (<i>Gunomys</i> & <i>mus</i> sp.)

Comparison of rat-flea species in three Shanghai surveys

	STANLEY	HICKS	C. Y. WU
Period of survey	1910	1923-25	1932-36
No. of fleas examined	?	2,893	19,000
<i>X. cheopis</i>	Present	331 (11.4%)	1,040 (6%)
<i>L. musculi</i>	?	1,477 (51.1%)	14,440 (76%)
<i>Cerat. anisus</i>	?	?	3,344 (17.6%)
<i>Cerat. fasciatus</i>	?	?1,051 (36.3%)	
<i>Ct. felis</i>	?	34 (1.2%)	
<i>Ct. canis</i>	?	?	76 (0.4%)

IV. SERUM THERAPY

Though attempts to prepare a potent anti-plague serum go back to the year 1895, results were for a long time not particularly successful. In fact the Indian Plague Research Commission reported in 1912 that neither Yersin serum (prepared by injection first of killed and then of living plague bacilli into horses) nor antitoxic sera from horses injected with the nucleoproteins of the plague pasteurella, proved "a practicable means of bringing about any material diminution in mortality from plague in India." The report admitted that better results might be attained when treatment could be started within a few hours after onset of the disease, but this seemed impossible in the great majority of cases.

A vigorous attempt to produce a more potent serum was made by NAIDU, MACKIE and their collaborators who decided to work with ruminants (sheep, bullocks and buffaloes) which in contrast to the horse are susceptible to pasteurella infections. Much time and energy was devoted to this work, and a most promising young research worker, Dr. Shamsher Jung, succumbed in its course to pneumonic plague infection. It is therefore distressing to find that the encouraging early reports on this new serum were not substantiated by further experience. SOKHEY, in a report published in June 1936, admitted

that like its predecessors it was unable to save lives, as soon as bacteraemia had developed. (Out of 79 patients treated at this stage, 76 died).

Undaunted by so many failures, SOKHEY resumed the investigation, using once more horses which were immunized first with cultures rendered avirulent by prolonged weekly subcultivation at 37.5°C, then with virulent cultures and bouillon culture filtrates containing the toxin. The progress of immunization was measured with the aid of a new *protection test*, determining the amount of serum that would protect laboratory-inbred white mice against a standard infective dose of *P. pestis* injected at the same time but at a different spot. Immunization of the horses was pushed until a high degree of potency, as indicated by these tests, had been reached. Comparing different sera with their aid, the following results were noted:—

<i>Mouse protective dose</i>	
New serum	0.05 c.c.
NAIDU Buffalo serum	0.3 c.c.
Pasteur Institute serum	0.5 c.c.
Lister Institute Serum	0.5 c.c.
Serum X (commercial)	Even 0.5 c.c. of no use.

Curative tests were based upon the fact that mice infected with the standard infective dose develop bacteraemia within 72 hours. Hence treatment of mice by intravenous injection of serum was commenced three days after infection and continued at 24 hourly intervals. Three doses each of 0.3 c.c. of the new serum saved 70-80 per cent of animals while NAIDU'S serum merely prolonged life up to 25 days (as against 5-9 days in the controls).

Besides the Haffkine Institute three other research laboratories have recently reported new methods of serum preparation:

(1) PIRIE and GRASSET of the South African Institute of Medical Research, concentrated their immune serum, obtained by intravenous injection of horses with heat-killed local strains of *P. pestis*, by two additions of sodium sulphate by which they were able to discard the Euglobulin fraction and to obtain the Pseudoglobulin fraction containing most of the immune bodies. They used wild *Rattus rattus* to test both the unconcentrated and the concentrated sera, applying the infective dose subcutaneously, and the serum intraperitoneally either before infection, simultaneously with it or after it. Both the unconcentrated and the concentrated sera were found able to save animals though in some of the tests multiples of the M.L.D. were used for infection; the concentrated serum was found four times as potent as the unconcentrated one. For practical purposes a less concentrated serum, three times as potent as the original product,

was chosen so as to keep it safe for intravenous injection. The dose recommended was the same as in the case of unconcentrated serum.

(2) JOUKOW-WEREJNIKOW and Coll. of the Saratov Microbiological Institute tried, in addition to the usual anti-plague sera, those produced through immunization of horses with (a) lysates of plague cultures (grown at 37°C and consequently containing the envelope substance) obtained through repeated freezing and thawing; (b) isolated envelope substance of the *P. pestis*, obtained by washing plague cultures grown at 37°C in the shaking apparatus with slightly alkaline saline. They decided to test these different sera by infecting guinea-pigs subcutaneously and administering the sera simultaneously by the intraperitoneal route. Though unable to save the life of any of their test animals they found the new sera more effective than nucleoprotein serum, though less so than Yersin serum. The authors admit that this result is not particularly encouraging but claim to have had better success by hyperimmunizing horses with envelope substance. To our knowledge details upon this work have not yet been published. SUKNEFF and Coll., continuing the earlier work of JOUKOW-WEREJNIKOW and collaborators found that Yersin serum prolonged the life of the guinea-pigs tested to an average of almost 24 days as against 4 days in the controls. Animals protected with anti-envelope serum lived to an average of 9.4 days, those receiving nucleoprotein serum, 7.6 days. They recommended combination of serum administration with bacteriophage treatment and also suggested that combined injection with all three sera studied by them might improve results.

(3) GIRARD and ROBIC of Madagascar reported upon a serum obtained through immunization of horses with their avirulent plague strain (intravenous injection of living bacilli). Experimental results were most promising in so far as none of the white mice receiving $\frac{1}{2}$ c.c. of this serum simultaneously with an infective dose killing all controls within 48 hours, died, while only one died out of 18 animals when treated with the same serum dose 24 hours after infection. Results in guinea-pigs were not so satisfactory but here also some of the protected animals survived.

Clinical results with these new sera are up-to-date too scanty to enable one to form an opinion as to their practical value. Much though one dislikes to say so, one has seen too often how initially favourable records have not been upheld by further experience. It must be emphasized, on the other hand, that the experimental results recorded by GIRARD and ROBIC, and especially by SOKHEY, are remarkably good.

V. VACCINE PROPHYLAXIS

(Killed Vaccines vs. Avirulent Live Vaccine)

Although judgment has to be reserved upon the practical value of sero-therapy in plague, solid progress has been achieved in the realm of vaccine prophylaxis.

The evolution of active immunization against plague has been similar to that of sero-therapy. Soon after the discovery of the plague bacillus in 1894, vaccines became available. Though different methods were introduced for their preparation, at first only two kinds were used on a large scale, namely, the vaccine prepared from fresh agar cultures, as advocated by KOLLE and other German workers, and HAFFKINE'S fluid, obtained through prolonged cultivation of the bacilli in nutrient broth; in both cases the bacilli were killed by heat in the course of manufacture.

Not only have the relative merits of agar and broth-grown vaccines been vigorously debated, but opinions have not been wanting that both are unsatisfactory. For instance, OTTEN, as a result of an exhaustive laboratory study completed in 1933, came to consider all "killed" anti-plague vaccines of no real value. In fact in Java, where he works, inoculation with such prophylactics has been discarded as a practical anti-plague measure. There, as well as elsewhere, another method of anti-plague vaccination has come to the fore, namely, inoculation with living avirulent bacilli.

This method has also a long history. The attention of early workers had been attracted to the fact that animals surviving infection with a plague culture which had spontaneously lost in virulence, were liable to prove immune when re-tested with virulent material. Systematic studies undertaken by KOLLE and OTTO and others showed that, as far as laboratory tests went, results with this method were vastly superior to those obtainable with any of the "killed" vaccines. That it might be applied with impunity to human beings was first demonstrated by YERSIN who with rare courage inoculated himself with living bacilli which had merely become attenuated in virulence but still produced a rat mortality of 30 per cent. STRONG in Manila, using the avirulent strain studied by KOLLE and OTTO, inoculated in 1907 some hundreds of prisoners with live vaccine, without any mishap.

It was, however, not until 1934 that this work was resumed on a large scale by OTTEN in Java and independently by GIRARD and ROBIC in Madagascar. It should be added that POKROVSKAYA in Russia reported in the same year on experiments with an avirulent plague strain which she considered as a true mutant obtained through

bacteriophage action. But, as far as we know, tests with this strain have thus far been restricted to laboratory animals.

OTTEN uses for practical work a strain of rat origin which, after rat passage and storage in deep serum-agar stab culture, spontaneously lost its virulence to such a degree that rats could survive subcutaneous injection with living suspensions of one or even two whole agar slants; repeated passage from rat to rat failed to re-establish virulence of the strain. It was found, on the other hand, that if rats were inoculated with suspensions of 1-2 agar slants killed by heating at 60°C, 35 per cent died within 48 hours from toxæmia. An explanation of this phenomenon seems to lie in the fact that a fresh suspension of the live avirulent bacilli was only slightly, if at all, toxic, so that the rats could withstand the endotoxins gradually produced by the slowly dying bacilli. If, on the contrary, the live virus was injected intraperitoneally, death from toxæmia was likely to result, as in this case the bacilli were subject to quicker destruction. OTTEN'S strain had a tendency to dissociate, and care had to be taken to work with smooth bacilli in order to obtain optimal results.

The experimental results obtained by OTTEN up to March 1936, may be summarized as follows:—

Immunizing dose (slants)	Percentages of survival when infected 3 weeks after immunization with a standard dose of virulent bacilli		
	House rat	Guinea-pig	
2	90.0	—	
1	80.0	95.8	
1/5	75.0	95.0	
1/25	100.0	100.0	
1/50	86.6	96.6	
1/100	80.0	88.6	
1/500	100.0	83.3	
1/1,000	82.0	80.0	
Totals	(510 rats)	81.7	(455 gps.) 90.7
Controls	(200 rats)	1.0	(170 gps.) 0.0

It was found that immunity reached an appreciable degree within a few days but became significant only after 5-7 days, attaining a maximum after 2-3 weeks; there was no evidence of a negative phase. The immunity of rats showed a considerable decrease after 6 months, but consideration should be taken of the bad general health they were in by then. The immunity of guinea-pigs was still fairly satisfactory after this period; it was still appreciable though markedly decreased after 9 months.

It was found that in man the live vaccine caused only a small infiltrate at the site of inoculation, with slight, if any, rise in tem-

perature. Even a dose of $\frac{1}{4}$ slant was tolerated by volunteers without any serious local or general symptoms.

An extensive campaign with the new vaccine was carried out by the alternating case system at the end of 1934. The population of two districts in Java was divided up as evenly as possible, with due regard to sex and age. One of these groups was inoculated, the dose being $\frac{1}{5}$ th of an agar slant (corresponding to 3,000 millions of bacilli) for adults, and half of this for children. After inoculation a close watch was kept for any plague cases by performing spleen and lung puncture upon every dead body and sending the smears thus obtained, as well a fragment of the spleen, to the laboratory for examination. The results in the two groups may be summarized as follows:—

Subdistricts	Vaccinated			Unvaccinated		
	No.	Deaths	Mortality per mille	No.	Deaths	Mortality per mille
Bandjaran	18,479	28	1.5	20,669	103	4.9
Batoedjadjar	18,956	10	0.5	24,088	110	4.6
Totals	37,435	38	1.01	44,757	213	4.75

OTTEN points to several factors tending to vitiate these statistics:

(1) It had been decided to omit cases of primary pneumonic plague from the statistics, since vaccination was considered to give no protection against air-borne infection. On the other hand, considering the technique of examination, there can be little doubt that in both groups cases of primary pneumonic plague remained undetected. In other words, the fatal cases in the vaccinated must have included a number of people who were actually unprotected against the form of illness they contracted.

(2) There was an appreciable number of persons who left the two subdistricts temporarily to work on plague-free estates, thus running a lesser risk of infection. It could actually be shown that among the non-vaccinated the plague mortality of these "absentees" was half that of the people who stayed at home uninterruptedly. OTTEN maintains that this factor influenced the statistics to the disadvantage of the vaccinated group.

(3) The average age of vaccinated children was much higher than that of the controls. Since it could be shown that among the unvaccinated the mortality of children of 1-5 years was lower than

among the group 6-15 years, it is clear that the value of the figures must be correspondingly affected.

OTTEN considers, nevertheless, the results obtained in Batoedjadjar as fairly representative, so that a reduction of mortality to 10 per cent may be considered attainable. This compares most favourably with the results of Haffkinization carried out in Java in 1921-22 by the alternate case system when a reduction of the mortality to 50 per cent was attained. On the other hand, OTTEN admits that a reduction to 10 per cent is not realizable in practice as it would be essential in that case to inoculate the *whole* population with the live vaccine. He thinks therefore, that a 75 per cent reduction of the mortality rate may be considered feasible under ordinary field conditions.

In 1935 mass vaccination was performed in some districts of Java, the total number of vaccinations carried out during the year amounting to 2,082,281 with 236,056 revaccinations. In the Preanger district 1,875,000 persons, representing more than 94 per cent of the population, were inoculated. The small remainder comprised persons absent at the time of vaccination, and not those unwilling to submit to the operation. OTTEN calculates a reduction in mortality among the vaccinated to 17 per cent. Seeing that this percentage was reached in a rather rough manner and cases of primary pneumonic plague were included, he considers that this reduction fairly approached that reached in the 1934 test. In other words, he says that the favourable results of the 1934 campaign (the statistical value of which is beyond doubt) are also attainable in mass vaccination. This conclusion was also substantiated by a comparison of the plague graphs for 1933-1935. You will note that the decline in 1935 was quicker and deeper and that the curve remained on a low level until December.

OTTEN supplemented his work by an interesting study upon a number of plague strains from different parts of the world which were from 5 to more than 15 years old and had been stored in agar stab culture at 5°C. He was able to isolate avirulent variants from several of these still virulent parent cultures. These avirulent variants showed great differences in antigenic potency, some possessing a high immunizing value, others appearing almost devoid of this. It seemed that the immunizing properties depended on a compound of antigens, of which two could be demonstrated; one producing the highest degree of immunity in rats, the other in guinea-pigs. In OTTEN'S opinion it would be well, therefore, to use in future work a mixed live vaccine consisting of strains which are highly efficacious both for rats and guinea-pigs.

Turning now to the work in Madagascar, it may first be stated that GIRARD and ROBIC worked with a strain from a human plague victim which had become avirulent while being subcultured each month for 5 years on agar at 16-20°C. It proved entirely innocuous to guinea-pigs and rabbits when administered subcutaneously, cutaneously, by the ocular or tracheal route, or by mouth. Intraperitoneal inoculation of one-third of a slant or more, produced in some animals a fatal peritonitis with bacteraemia; growths isolated from them proved as avirulent as the original strain. If animals receiving lower doses intraperitoneally, were killed 5-15 days afterwards, they showed in the spleen, more rarely in the liver, small foci of reaction which disappeared between the 15th and 20th day. These seem to be due to the destruction, in these organs, of leucocytes and macrophages which in their turn have engulfed and destroyed the bacilli. The authors lay great stress upon these reactions which show that their strain is not entirely devoid of pathogenic power, because in their experience, entirely avirulent and atoxic strains possess no immunizing power.

Guinea-pigs, to which GIRARD and ROBIC's strain was administered by the subcutaneous, cutaneous or ocular route, acquired a solid immunity against infection with enormous doses of virulent plague bacilli. They proved immune when bitten by infected *X. cheopis* which killed controls in 5 days, and also towards intratracheal inoculation producing fatal plague pneumonia in 100 per cent of the controls. Immunity becomes manifest on the 5th-6th day and is complete on the 10th day; it appears to last for a long time, some of the animals still proving immune after periods exceeding one year. GIRARD and ROBIC add that mice and *Rattus norvegicus* cannot tolerate large doses of this vaccine on account of their sensitivity to plague toxin, but they can be satisfactorily protected with small doses. *R. rattus* behaves like the guinea-pig.

Human vaccination is carried out in Madagascar by subcutaneous injection in the left forearm. The dosage finally adopted was 1.5 milliards, i.e. about 1/10 of a slant. Persons from 2-80 years have been included in the campaigns. The reaction consists, in 90 per cent of cases, of mild fever (37.5°-38.5°C) for 2 days, accompanied by a moderate local reaction. This becomes reduced towards the fifth day to a nodule the size of a small nut, which gradually disappears. Some people, particularly children, show markedly mild reactions; for this reason the adult dose is now given to the latter. In rare cases of severe reactions there was never any serious impairment of health; even two volunteers, inoculated with a whole slant of the live vaccine, developed no alarming symptoms.

A vaccination campaign was carried out in 1934-1935 in a district with 106,000 inhabitants, 46,000 of whom received inoculation. Every possible care was taken to ascertain the number of plague cases occurring afterwards in this district, including animal experiments with material from the lung and liver in *all* cases of death. The following conclusions were reached:—

- (1) In the vaccinated group the mortality from plague was reduced by two-thirds, and the general mortality by 50 per cent.
- (2) Not a single case of primary or even secondary pneumonic plague was noted among the vaccinated as against 17 in the controls.
- (3) In the dead bodies of vaccinated individuals succumbing to plague, bacteraemia was considerably less conspicuous than in the corresponding control cases. Even in the case of the bubo contents, often animal experiments were necessary to establish diagnosis.

No final data are available with regard to more than 700,000 inoculations given in 1935-1936, but preliminary results seem satisfactory.

In comparing their strain with a sample of OTTEN'S culture, GIRARD and ROBIC consider the latter which is more attenuated, easier to manage, but comparative studies both in Madagascar and at Paris tend to show that its antigenic value is somewhat less. It should be added that OTTEN, carrying out such a comparison in his turn, found the Madagascar strain superior as far as guinea-pigs were concerned, but recorded better results with his own strain in the case of house-rats.

Workers interested in vaccination with "killed" vaccine have by no means remained idle. A "sugar vaccine" has been devised by MINERVIN and others but, as far as I know, this has not yet passed the laboratory stage. The same holds true of the new vaccine of KURAUCHI and HOMMA, representing the purified and concentrated capsular antigen of the plague bacillus. It was found that, through absorption of this substance with metal salts, an emulsion resulted which produced complete immunity in test animals if administered in a single dose.

Many improvements have been introduced in the manufacture of Haffkine's vaccine. Indeed the 1932-1935 report of the Haffkine Institute states that the product now issued is 30-60 times as potent as that of 1930. Carrying out a comparative study with the aid of biological standardization, the following results were obtained:—

Vaccine	Minimum Mouse Protective Dose	No. of experiments
Haffkine	0.001 c.c.	8
Lister Institute	0.008 c.c.	5
Berne Institute	0.015 c.c.	4
Pasteur Institute	0.015-0.03 c.c.	7
Bayer	0.1 c.c.	5

SOKHEY, commenting upon the fact that he obtained satisfactory experimental results with Haffkine's vaccine even in guinea-pigs while other investigators, using their prophylactics, failed to do so, finds a likely explanation in the different temperatures used for killing the bacteria (55°C for 15 minutes in the case of Haffkine's fluid, and 60-70 degrees for 1 hour for agar grown vaccines). He recorded the following experiment:—

Emulsion containing 3,000 million P. pestis:

When heated at 55°C for 15 min.	Protecting 4 out of 5 mice in doses of 0.002 c.c.
When heated at 60°C for 1 hr.	Not protecting in doses of even 0.3 c.c.

This is interesting but, recalling the previous table you will see that agar-grown vaccines are not as black as painted by SOKHEY!

It was found in the Haffkine Institute that plague growths could gradually be rendered avirulent by subculturing them at weekly intervals at 37.5°C for about 60-70 weeks. It could also be established that 0.5 c.c. of a 48 hours' old broth culture of such a strain protected mice against a standard infective dose. However, comparing the protective power of such a living avirulent virus with that of a broth vaccine prepared from the same strain in its virulent condition, the latter was found to be 30 times as potent as the former. The workers of the Haffkine Institute believe, therefore, in the superiority of their broth vaccine, even in comparison with living avirulent virus. But before any definite judgment can be passed in this respect, more extensive studies seem called for, including a careful comparison of the avirulent strains actually used in Java and Madagascar with the standard Haffkine broth vaccine.

In attempting to assess the relative merits of the three categories of vaccines, it would be well to bear the following points in mind:—

(1) Agar-grown vaccine has the advantage of quick and comparatively easy preparation as well as simple standardization. Hence, though stock vaccine may have to be used at the commencement of an anti-plague campaign, the latter may be carried on with brews prepared from freshly isolated local strains. On the other hand, it must be admitted that, as far as the experimental evidence

goes, the record of agar-grown vaccine is the least satisfactory of the three types. It may be argued, however, that experimental results are not always the most reliable yardstick with which to measure the value of a vaccine in actual field work. The comparatively mild reaction produced by agar-grown vaccine certainly speaks in its favour. A point deserving serious attention is, whether the potency of such vaccines might not be enhanced by reducing the time and temperature used at present for their sterilization.

(2) The preparation of Haffkine's prophylactic fluid is a rather tedious business. It is also less easy to standardize than agar-grown vaccine and produces a much more marked reaction. The workers of the Haffkine Institute are confident that they will overcome this difficulty, but at present it militates against adoption of this method in a country like China where the success of an anti-plague campaign may depend, more than on anything else, upon the goodwill and cooperation of the population. The experimental evidence recently brought forward in favour of broth vaccine certainly deserves great attention, but the last word has yet to be said on the subject.

(3) The evidence presented in favour of living avirulent virus is certainly impressive. The fear that the strains used for practical work may revert, if I may use the term, to their atavistic tendencies, causing plague cases among the inoculated, may be considered as unwarranted. Rather have we to guard against a change in the opposite direction, whereby the strains lose even the remnants of any pathogenic power they may possess, with resultant loss in antigenic value. The preparation of live vaccine, though simple in itself, calls for great experience and constant vigilance. A further difficulty is that, unlike the other two categories, live vaccine cannot be stored for fairly long periods but must be used within a short time, being kept meanwhile at ice-box temperature (5°C). Hence its administration calls for an elaborate organization which may not be available under emergency conditions.

You will see, therefore, that there are advantages and disadvantages in the use of each of the three vaccines. As to which will prove the ideal prophylactic, it is impossible to say at the present stage.

Yet, when all is said and done, vaccine prophylaxis in plague can at best only be a palliative measure. We may reduce morbidity and mortality, but until the connection between man and rodent is severed, it is idle to hope for a complete eradication of plague in endemic areas.

VI. RAT-PROOFING

A remarkable change has taken place during the last 50 years in the general conception of preventive medicine. Public health officers of the old school who are now dead would, I fear, turn in their graves were they to contemplate the revolution in present-day methods of approach towards problems of public sanitation. If that were possible, they would raise their hands in horror at our practice of continuous disinfection as opposed to the time-honoured fetish of *terminal* disinfection. As in the case of infectious fevers, so in plague prevention, a revolution in ideas has resulted from a new conception based on the impossibility of getting rid of the rat altogether by means of the usual eradication measures. *Prevention* of infestation, rather than *disinfestation*, is now our aim.

Recognizing that plague is primarily a disease of rats, former sanitarians naturally concentrated upon measures of destruction. There are however, several drawbacks.

Firstly, chemical, bacteriological and gaseous poisons such as barium carbonate, arsenic, strychnine, squill, phosphorus, Danysz virus, and cyanogas, are liable to prove dangerous to domestic animals and even human beings.

Secondly, it has been shown that indiscriminate rodent destruction during a plague epidemic may be more harmful than beneficial. It may lead to the escape of rats from the infected focus into hitherto free areas. Furthermore, it may not only produce a greater concentration of fleas on the surviving rats but may *directly* facilitate human infection by these insects.

Thirdly, rat destruction, however effective, is only valuable if it is constantly kept up. We now know the extreme fertility of this rodent. It has been computed that, theoretically, an average pair of rats, living two and a half years and producing eight young ones every three months, will at the end of that period have left behind 2,621,440 descendants. Fortunately for man's continued mastery, the forces of nature come into play to restrict the scourge. Diseases, the struggle for food and shelter, and natural enemies, serve as a brake upon the exuberant increase of the rat population.

The realization that rat destruction *per se* is inadequate has led to the now almost universal conception that the evil must be destroyed at its root. That is to say, we should aim at the elimination of the principal biological necessities of the rat, namely, the protected home and nest in which to shelter and rear the helpless young, and an available food supply. In the absence of these, it is obvious that successful propagation is impossible. Thus

has the science and art of *rat-proofing* come to the fore in recent years as the most effective measure in our concerted attack upon plague. We may, then, define *rat-proofing* as the mechanical process whereby a structure is rendered safe from rodents. Its purpose is to eliminate any space, hole or burrow in a building or a ship which may serve as a hiding, nesting or breeding place. Extensive experience in America, Java and other countries in the management of epidemics has proved conclusively the supreme value of this line of attack.

This is not to say that *rat-proofing* alone should be employed. The problem is not quite so simple. In India, China and other countries where plague occurs among the rural population, *rat-proofing* often proves impracticable on account of economic or social factors. In public health work one has very often to temper the wind to the shorn lamb. Where *rat-proofing* of a permanent character is not feasible, it is usually possible to apply temporary measures such as abolishing or filling up of hollow spaces, protection of food receptacles, raising of flooring, etc.

It must be admitted, however, that *rat-proofing* has found its greatest usefulness in the campaign against rats on board ships. The reason is obvious. A ship is a self-contained unit, and the various structures can be easily rendered *rat-proof* either at the shipyards or after she has been put into commission. It is clear that in the case of a village or a rural community, the decision to render all the usual ramshackle buildings *rat-proof* is often not within the bounds of practical politics. What is aimed at by sanitarians in plague endemic areas is that all new construction should be *rat-proofed* in accordance with law, while simple structural alterations could be made in existing buildings to render the contact between man and rat less intimate. Effective *rat-proofing*, however, requires money. In fact, administrators realize that running through the inlay of all preventive medicine is a fine filigree of gold.

CONCLUDING REMARKS

You will have observed, even from this very rapid survey, that new and suggestive avenues have been opened up during the past decade for tackling the age-old problem of plague. In spite of the many lacunae in our knowledge of the behaviour of pandemics (why they arise, how they arise, what factors influence their decline and ultimate disappearance), we are buoyed up by the realization, born of the experience of history, that *time and tide are on our side*.

Time is with us, because we know that civilization is never static; knowledge must, by its very nature, move forward with ever

increasing dynamic force. Europe, once the rampage ground of plague epidemics, has proved impermeable to the current wave of infection. Is it too much to expect that Asia and Africa and America will one day erect an impenetrable barrier against this dread disease?

Tide is also on the ebb, for despite periodical exacerbations—serious when viewed at close range, but mere ripples if seen through the perspective of history—there are welcome signs of a steady decline in the present pandemic wave, so that before our children's children see the light of day, the spectre of the Black Death will have vanished from the face of the earth.

SHANGHAI QUARANTINE STATION

BOARDING DIVISION IN 1936

BY C. Y. WU (伍長耀)

Chief, Boarding Division, Shanghai Quarantine Station

It is usual to begin this report with a brief survey of the epidemic situation in Shanghai. The year under review has been a comparatively healthy one considering the size of the area known as Shanghai which comprises three municipal entities, Greater Shanghai, by far the largest in area and population (Chinese controlled), the International Settlement and the French Concession. The present population is nearly 3,900,000, which makes this city the sixth largest in the world, coming after London, New York, Tokyo, Berlin and Chicago. What more closely concerns us is that Shanghai is the largest port in Asia and the fifth in the world in point of tonnage entering and clearing the harbour.

Cholera again did not make its appearance, although it is dangerous and unscientific to be too optimistic about the future course of the disease in this region. It may be that public health measures, such as mass inoculation, disinfection of wells and other sources of polluted water supply, provision of free piped water during the summer for those who would otherwise have had to depend upon contaminated creeks and wells, propaganda on personal hygiene, etc., are making their weight felt, but it is perhaps just as likely that we are merely passing through a quiescent stage in the cholera cycle. The epidemiology of cholera in China, especially in the Yangtze region, is still imperfectly studied, and public health authorities would do well to intensify their efforts against a recurrence of the disease.

With regard to smallpox, it may be recalled that in my last report* I stressed the fact that although the disease appeared to be on the wane, optimism was unwise so long as the whole population was not regularly protected by vaccination. In 1935 we had only 58 cases (10 deaths); for the year under review there were 329 with 87 deaths. At the time of writing smallpox is definitely epidemic in this area, the incidence rising to over 50 cases a week. There is every indication that the present epidemic will exceed that

*Rep. Nat. Quar. Serv., Series VI, 1935-6, p. 82.

of 1932 when there were 678 patients of whom 293 died. There were many confluent and haemorrhagic cases among those who had never been vaccinated or who were vaccinated only once, in childhood. On the whole the disease met with in this country is of the variola major type, claiming a high mortality. Details of the incidence of notifiable diseases in Shanghai are shown in a table attached to the report of the medical services division.

INSPECTION STATISTICS

The year 1936 has been a healthy one from the viewpoint of medical inspection of incoming vessels. No ports were proclaimed infected and no arriving vessels ordered into quarantine. Medical inspection proceeded normally. The U.S. shipping strike which began on October 30 on the Pacific coast had a marked effect on the number of American ships arriving at Shanghai. The tie-up was progressive, so that the virtual absence of U.S. shipping from Asiatic ports was particularly noticed in January 1937. Even during the last two months of 1936, however, there was a clear falling off in numbers and tonnage. Thus, U.S. vessels inspected by this division in 1935 totalled 232 and aggregated 2,487,521 gross tons, while for 1936 the figures are respectively 195 and 2,099,186.

The total number of vessels inspected also fell short of the 1935 figure, being 1,821 as compared to 1,927. Gross tonnage for 1936 was 14,173,277 and for 1935, 14,496,747. Table I gives comparative figures for 1932 to 1936.

TABLE I

No. and gross tonnage of vessels inspected, 1932-36

Year	No. vessels	Gross tonnage
1932	2,324	14,901,911
1933	2,196	15,001,208
1934	1,943	14,126,350
1935	1,927	14,496,747
1936	1,821	14,173,277

In studying the above figures it must be borne in mind that only vessels actually boarded by quarantine officers are included. This means that only ships entering Shanghai from foreign ports are taken into account, except when a Chinese port is declared infected, in which case vessels arriving therefrom are subject to medical inspection. Coastwise and river shipping calling at Shanghai aggregates several million tons annually. Junk traffic is also enormous.

Of the 1,821 vessels, 644 or over one-third were Japanese, and 465 British. The British gross tonnage, however, exceeded the

Japanese by over 800,000, being 4,471,931 as against 3,631,737. The Stars and Stripes again took third place, in spite of the Pacific coast shipping tie-up during the last two months of the year. Germany came fourth with 114 vessels and 1,079,713 gross tons. The increase in tonnage as compared with 1935 (116 vessels, 970,260 G.T.) is accounted for by the fast service of three new liners of the Norddeutscher Lloyd, *Potsdam*, *Gneisenau* and *Scharnhorst*—undoubtedly the finest ships at present on the Europe-Far East run. Norwegian, French, Netherlands, Danish, Chinese, Italian, Swedish, U.S.S.R., Panamanian and Greek vessels came next in that order. Netherlands ships showed a big increase from 43 (286,721 G.T.) in 1935 to 63 (447,676 G.T.) in 1936. Fourteen nationalities were represented as compared with seventeen in 1935. No ships flying the Finnish, Polish or Yugoslavian flag entered Shanghai in 1936.

TABLE II

Nationalities and gross tonnage of vessels inspected in 1936

Flag	No.	G. T.	Flag	No.	G. T.
British	465	4,471,931	Japanese	644	3,631,737
Chinese	38	103,159	Netherlands	63	447,676
Danish	51	310,798	Norwegian	96	544,263
French	73	870,551	Panamanian	7	47,880
German	114	1,079,713	Swedish	25	165,228
Greek	4	80,212	U.S.A.	195	2,099,186
Italian	28	262,221	U.S.S.R.	18	58,722
			Total	1,821	14,173,277
				—	—

Passengers passed by our officers totalled 112,764, being a reduction of 11,299 as compared with 1935. Of this number 47,216 were Chinese and 65,548 foreign subjects. Japanese vessels carried most passengers; of the 36,476 of all races, however, only 7,510 were Chinese. British ships came second with 28,327 of whom 14,346 were Chinese, and American ships third with 27,535 (13,700 Chinese). An increase in the popularity of German and Italian ships among Chinese returning to China was noticeable during the year; this increase is even more marked in the case of Chinese leaving this country for business or travel abroad. American, French and British (the latter including Canadian) vessels have always been deservedly popular, and with a little more attention paid to the comfort of their Chinese clientèle there is no reason why they should fear competition from any source.

飛汽艇載檢疫人員於黃浦江中登輪檢疫

Fig. 14. Boarding a vessel in mid-stream at Shanghai. The Quarantine Service's motor launch *Yueh Fei* is shown alongside.



由浮碼頭登巨輪檢疫

Fig. 15 Quarantine Officer boarding a large liner at Shanghai. The vessel is moored to buoys in mid-stream, and access is gained by way of a floating pontoon. Quarantine launch in the foreground.



檢驗日輪船員之情形

Fig. 16. Chinese quarantine officers mustering and inspecting the crew of a Japanese ship at Shanghai.

TABLE III

Passengers on inward vessels inspected in 1936

Nationality of vessels	Chinese	Foreign	Total Passengers
British	14,346	13,981	28,327
Chinese	3,214	168	3,382
Danish	5	229	234
French	1,644	3,018	4,662
German	442	3,156	3,598
Greek	—	1	1
Italian	1,327	1,676	3,003
Japanese	7,510	28,966	36,476
Netherlands	104	183	287
Norwegian	42	259	301
Panamanian	1	33	34
Swedish	—	52	52
U.S.A.	13,700	13,735	27,435
U.S.S.R.	4,881	91	4,972
	47,216	65,548	112,764

Officers and crews on vessels inspected in 1936 numbered 203,154 (210,143 in 1935) made up of 59,803 Chinese, 72,098 Europeans and Americans, 55,428 Japanese, and 15,825 Indians and others. British ships carried 34,900 Chinese crews out of a total complement of 69,600. There were 4,752 Chinese and 54,928 Japanese crews on Japanese ships. American vessels carried 8,064 Chinese (mostly stewards) and 19,587 U.S. citizens. Netherlands steamers had 4,146 Chinese on their lists with only 980 Hollanders.

TABLE IV

Crews on inward vessels inspected in 1936

Nationality of vessels	Chinese	European and American	Japanese	Others	Total Crew
British	34,900	20,470	332	13,898	69,600
Chinese	3,397	20	44	—	3,461
Danish	196	1,791	2	8	1,997
French	3,366	8,663	—	596	12,625
German	278	11,343	—	3	11,624
Greek	18	155	—	—	173
Italian	164	4,203	6	28	4,401
Japanese	4,752	10	54,928	101	59,791
Netherlands	4,146	980	1	990	6,171
Norwegian	522	2,739	16	3	3,280
Panamanian	—	272	—	—	272
Swedish	—	814	—	11	825
U.S.A.	8,064	19,587	99	187	27,937
U.S.S.R.	—	1,051	—	—	1,051
	59,803	72,098	55,428	15,825	203,154

BREACHES OF REGULATIONS

I have pleasure in reporting a marked falling off in the number of instances where agents and masters failed to carry out the quarantine regulations. Whereas there were 161 such instances in 1934 and 139 in 1935, there occurred only 30 during the year under review. This state of affairs is very welcome as it shows that our work is better understood. It conduces to smoother working of the quarantine machine and a more cooperative spirit all round. Only 5 vessels came in carrying expired or non-valid deratization certificates. Those that arrived without the agents or masters having previously notified this division numbered 11, while a similar number did not hoist the quarantine signal on entering the harbour. The most serious offence, viz. that of permitting communication with the shore before pratique was granted, was committed only on three occasions as compared with 12 in 1935 and 15 in 1934. Table V gives a comparision of the data for the three years:

TABLE V

Types of offence against regulations, 1934-36

INSPECTION AFTER HOURS

This concession to shipping agents and consignees was continued in 1936 with satisfaction to all concerned. It is understood, however, that the practice can only be followed during normal times, the quarantine authorities reserving the right to refuse medical inspection after daylight hours when circumstances so demand. Shanghai is merely a transit port to a large proportion of ocean-going liners, many vessels stopping twenty-four hours or less.* Hence in the event of delayed arrival through bad weather or any other cause, it may be necessary for a ship to discharge or load cargo in a hurry. The quarantine service is at all times ready to contribute its share towards expediting the movements of passengers and cargo, provided the fundamental laws of quarantine as set out in the official regulations are observed.

*An exception is the Lloyd Triestino line whose luxurious liners, *Conte Rosso*, *Conte Verde* and *Victoria*, make Shanghai their terminal port, remaining four days.

TABLE VI

Medical inspection of vessels after sunset

<i>Month</i>	<i>1933</i>	<i>1934</i>	<i>1935</i>	<i>1936</i>
January	11	22	16	19
February	12	9	11	15
March	18	12	15	15
April	20	8	19	11
May	8	9	13	6
June	3	4	10	17
July	5	14	9	9
August	10	10	8	9
September	6	10	10	12
October	10	20	9	20
November	11	17	15	17
December	23	20	22	11
—	—	—	—	—
	137	155	157	161
—	—	—	—	—

COFFIN EXPORT CERTIFICATES

Following the practice of former years, certificates were issued for the export of coffins with corpse on applications accompanied by medical certificates stating cause of death. Shanghai guilds applied for 1,349 certificates and individuals for 93, making a total of 1,442. These covered shipments of 8,020 corpses consigned to various parts of China and abroad. The figures for 1935 were 6,477 corpses covered by 1,312 certificates.

TABLE VII

Export certificates for coffins with corpse, 1936

<i>Month</i>	<i>Guilds</i>	<i>No. certificates</i>		<i>No. corpses shipped</i>
		<i>Indiv.</i>	<i>Total</i>	
Jan.	81	9	90	813
Feb.	79	5	84	239
Mar.	200	10	210	1,242
April	157	6	163	1,018
May	95	9	104	640
June	66	6	72	235
July	41	5	46	128
Aug.	40	6	46	143
Sept.	80	9	89	211
Oct.	140	10	150	755
Nov.	146	4	150	1,275
Dec.	224	14	238	1,321
—	—	—	—	—
Total	1,349	93	1,442	8,020
—	—	—	—	—

These figures include consignments to Hamburg, Havre, Marseilles, Norfolk, Philadelphia, San Francisco, Washington, D.C., Saigon, Manila, and Venice.

TABLE VIII

Inspection Statistics of Boarding Division, Shanghai, 1936

Nationality	No. of vessels	Gross tonnage	Passengers			Crew		
			Chinese	Foreign	Chinese	European and American	Japanese	Others
British . . .	465	4,471,931	14,346	13,981	34,900	20,470	332	13,898
Chinese . . .	38	103,159	3,214	168	3,397	20	44	—
Danish . . .	51	310,798	5	229	196	1,791	2	8
French . . .	73	870,551	1,644	3,018	3,366	8,663	—	596
German . . .	114	1,079,713	442	3,156	278	11,343	—	3
Greek . . .	4	80,212	—	1	18	155	—	—
Italian . . .	28	262,221	1,827	1,676	164	4,203	6	28
Japanese . . .	644	3,631,737	7,510	28,966	4,752	10	54,928	101
Netherlands . .	63	447,676	104	183	4,146	980	1	990
Norwegian . .	96	544,263	42	259	522	2,739	16	3
Panamanian . .	7	47,880	1	33	—	272	—	—
Swedish . . .	25	165,228	—	52	—	814	—	11
U.S.A. . . .	195	2,099,186	13,700	13,735	8,064	19,587	99	187
U.S.S.R. . . .	18	58,722	4,881	91	—	1,051	—	—
Total . . .	1,821	14,173,277	47,216	65,548	59,803	72,038	55,428	15,825

Total number of passengers 112,764
 " " " crew 203,154 } = 315,918

CONCLUSION

I wish to place on record the cooperation and valuable assistance rendered throughout the year under review by the Commissioner of Customs, the Chief Tidesurveyor, the Harbour Master and the out-door and in-door staffs of the Shanghai Maritime Customs, by ship owners and agents, and by masters and officers of vessels calling at Shanghai. Thanks are also due to other government and municipal organizations.

FUMIGATION DIVISION IN 1936

BY N. Y. CHIN (金乃逸)

Chief, Fumigation Division, Shanghai Quarantine Station

During the year under review, fumigation work was done along the general lines developed during the past few years. The procedure outlined in the last report was followed. Three principal fumigants, zyklon-B, sulphur dioxide gas and carbon monoxide and dioxide gas mixture, were used. Though the first-mentioned fumigant has many desirable features, its usefulness is limited by its high cost.

Since the new regulation regarding disinfection of second-hand articles (gunny bags, wool, cotton waste, etc.) originating from foreign countries came into force in December 1935, considerable work was done during the year. In this connection, thanks are due to the Customs and Postal Authorities for their help in enforcing this regulation.

Trapping along the water front was carried out as in previous years to supply the laboratory with rats for the rat-flea survey.

FUMIGATION

During the year 591 vessels were deratized. The total under-deck tonnage was 1,049,720 and the total number of rats destroyed 1,402.

The vessels treated can be classified into the following groups:

1. Local and river boats: (a) Launches, tugs; (b) Lighters; (c) River vessels.
2. Coasters: (a) Cargo; (b) Passenger.
3. Ocean-going vessels: (a) Cargo; (b) Passenger.

Group 1 (a) consists mostly of tug launches—vessels built for the dual purpose. Fumigations are required when they clear for other ports. They are used to tow lighters or rafts. Some are stationed in outports and do not call at Shanghai except for repairs and overhaul. They are usually very small, well under 100 tons. The crews' quarters and stores are practically the only places where rats may harbour.

The lighters present several interesting features. In Shanghai, one lighter may be known by several names and numbers. A

registered lighter privileged to carry certain types of cargo is assigned a registered number by the Customs. With few exceptions, each lighter has a company number given by its owners. When making application to clear from Shanghai, a lighter is considered as a cargo boat and hence in the application its company number must be given. In addition, the owners may apply for the OBB, BJ, BG numbers etc. to indicate that the lighter may carry oil. To complicate the numbers further still, a lighter may also have a consular registered number or name.

Among companies owning lighters are G. E. Marden & Co. (largest owners), James Magill & Co., Shanghai Transportation Co., Shun Tai Co., National Express Co., P. & O. S.N. Co., Blue Funnel Line, Shanghai Power Co.

Hankow is more a port for lighter traffic. Lighters arrive at that port from up and down river as well as from Hunan. During the low water season in winter, river vessels require lightening at Kiukiang, where cargo is partially discharged into lighters before they can proceed up to Hankow. For this reason, with the exception of a few lighters for local use in Shanghai, the China Navigation Co. lighters are registered in Hankow and they are called "Hankow lighters."

Towards the latter part of the year, river traffic as well as coastal traffic took a turn towards recovery. After a good crop, shipping increased. Quite a few lighters were chartered by agents in Shanghai for up river ports.

Besides deratization done at Shanghai, river boats now find it possible to be fumigated in Hankow.

Coastal traffic.—Marked improvement of the China Merchants S.N. Co. was witnessed during 1936. Besides the four new vessels built in England, a number of others were chartered. The four "Hai" steamers and several others were deratized by our Canton Station.

The San Peh S.S. Co. added a few vessels to their fleet. It is regrettable to note that the biggest vessels, *Hua Shan* and *Sung Shan*, are now chartered out and fumigated in Japan.

Vessels belonging to the China Navigation and Indo-China S.N. Co. ply regularly on the China coast and are fumigated either in Shanghai, Hankow or Canton. The Dairen Kisen Kaisha steamers are usually deratized at Dairen.

Ocean-going liners can be classified into two groups: the trans-Pacific and the Europe-Oriental.

Among the former the Empress liners have their certificates granted at Vancouver. The Dollar Line vessels have their certificates issued at New York and San Francisco, and the American Mail Line vessels at Seattle. The N.Y.K. steamers apply for certificates at San Francisco. The Wilhelmsen Line vessels apply for certificates from New York, as do Stanley and John Thompson's "Silver Fleet." The Danish Maersk Line vessels carry certificates issued at Baltimore or Philadelphia, the Isthmian S.S. Co. at New York, the Lykes Bros-Reply S.S. Co. at New Orleans, and the Blue Funnel vessels on the trans-Pacific service at Seattle and Vancouver. Among timber boats, the Tacoma Oriental Line's applications are made at Tacoma, and the Oceanic Oriental Line at Seattle. The States vessels of the United Fruit Co. usually have their certificates issued at Portland, and oil tankers from the west coast generally at San Pedro. The Japanese Kawasaki Line vessels are mostly fumigated at Kobe. The Norwegian Fearnly and Egar and the A. F. Klaveness vessels presented quite a number of certificates issued at Los Angeles.

Among vessels on the Europe-Oriental Service, those belonging to the P. & O. and B.I. are fumigated in Japan. The Ben Line steamers are fumigated at Leith or Middlesborough. The Glen Line vessels are now fumigated Middlesborough. The Blue Funnel Line applies for certificates at Liverpool or Glasgow. The French Messageries Maritimes cargo boats are fumigated at Dunkirk and the passenger liners at Marseilles. A few of the passenger boats consistently yield over a hundred rats after each fumigation. Rat-proofing of such vessels is undoubtedly indicated. The German Hamburg-Amerika Line vessels are fumigated at Hamburg, and the North German Lloyd vessels at Bremen. The Danish East Asiatic vessels' certificates are chiefly issued at Copenhagen, the Swedish East Asiatic Line at Gothenburg and the Holland East Asiatic Line vessels at Rotterdam. The N.Y.K. liners are fumigated in Japan. The Lloyd Triestino vessels are fumigated at Trieste.

Besides these, the six Netherlands vessels of the South African Line are mostly fumigated at Singapore or Durban. The Eastern Oriental steamers are all fumigated at Melbourne. The J.C.J.L. vessels are regularly fumigated at Shanghai. Their cargo boats are once in a while treated at Dairen or Keelung.

Thus most of the ocean-going vessels on regular service are fumigated either at their home ports or first loading ports. Those which are fumigated at Shanghai are usually tramps operated by Dodwell and Co., Lacey and Cannan, Gordon and Co., Y.K.K. etc. Unfortunately there is a reduction in the number of cargo boats

calling at Shanghai, thus materially affecting the amount of fumigation work here.

DERATIZATION EXEMPTION CERTIFICATES

A small number of deratization exemption certificates were issued after thorough rat infestation inspections had been performed by the fumigation staff. They were issued only to vessels on board of which the number of rats had been reduced to a minimum. They were chiefly oil tankers and timber boats.

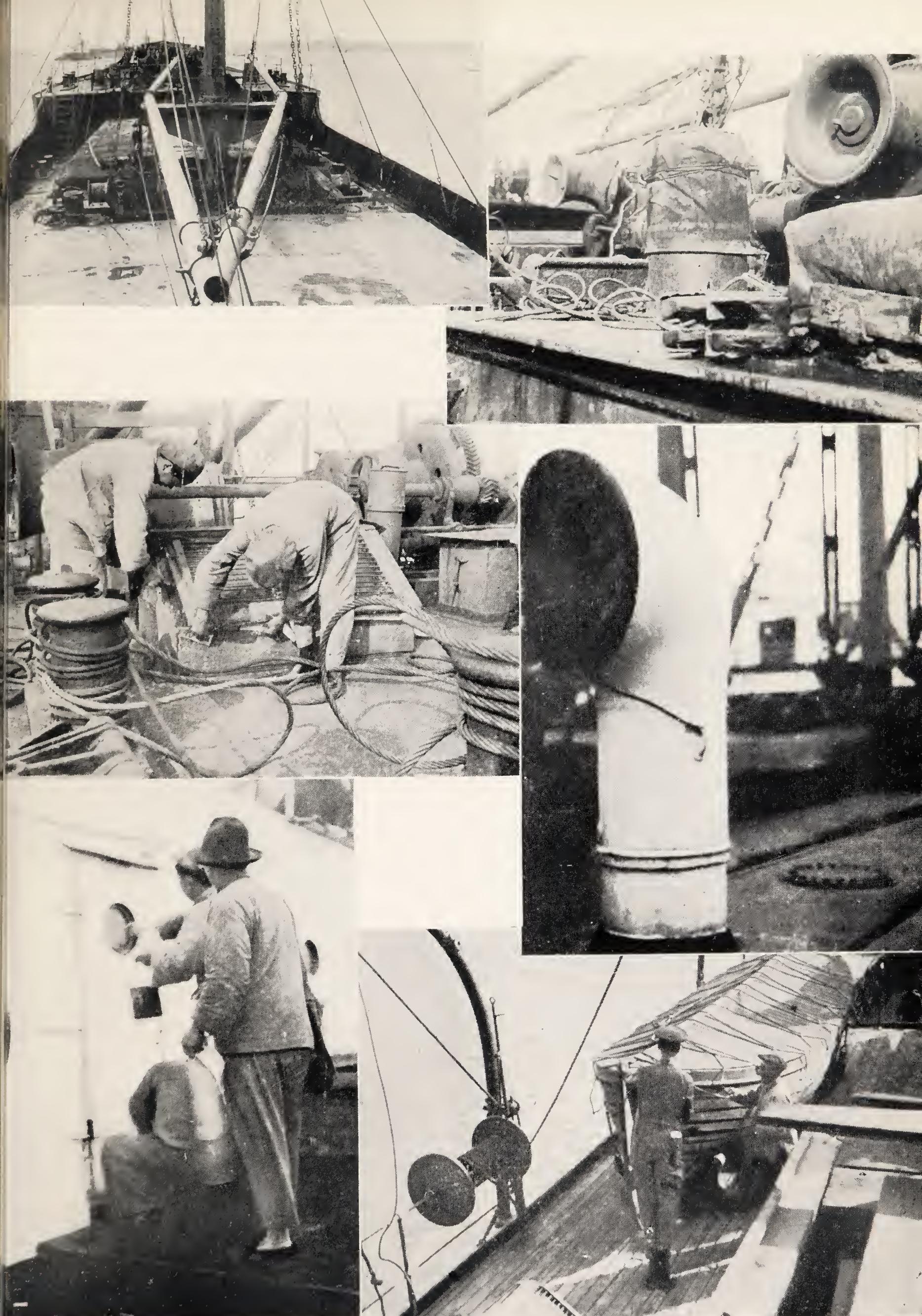
DISINFECTION

At the request of Dr. C. Y. Wu, chief of the Boarding Division, a few infected vessels were disinfected with formaldehyde gas.

Parcels of second-hand goods, old cotton, old gunny bags, wool waste and old clothing imported from foreign countries were disinfected before delivery to the consignees unless they had previously been treated by a proper health authority and duly covered by certificates of disinfection issued at the port of departure.

TABLE I
Showing vessels fumigated, classified according to nationality

No. U.D.T.	Chinese	American	British	Danish	French and U.S.S.R.	Greek	Italian	Japanese	Netherland	Norwegian	Total
Jan.	17	—	12	—	—	—	—	2	2	1	34
	27,430	—	25,184	—	—	—	—	2,468	12,356	3,574	71,012
Feb.	19	1	13	1	—	—	—	2	1	—	37
	26,091	1,500	27,323	1,500	—	—	—	2,000	7,411	—	65,825
Mar.	23	2	14	—	—	—	1	3	2	—	45
	26,990	1,000	16,345	—	—	—	1,500	8,552	13,883	—	68,270
Apr.	39	1	17	—	—	—	—	4	2	2	65
	61,369	500	51,536	—	—	—	—	4,000	14,546	5,479	137,430
May	23	3	20	1	1	—	—	6	2	1	57
	24,643	1,500	29,480	4,272	2,993	—	—	8,000	7,911	4,315	83,114
June	22	—	14	1	1	—	—	1	2	2	43
	22,094	—	27,689	4,010	1,500	—	—	1,500	13,879	6,650	77,322
July	33	1	9	—	—	1	1	4	1	—	50
	37,512	500	20,722	—	—	4,885	1,500	5,968	7,411	—	78,498
Aug.	20	1	12	—	1	—	—	6	3	1	44
	27,500	500	43,802	—	1,500	—	—	10,657	17,676	1,500	103,135
Sept.	27	2	13	2	—	—	—	8	2	—	64
	36,280	1,000	16,312	3,000	—	—	—	8,468	13,162	—	78,222



薰船前封閉船上各部情形

Fig. 17-22. Sealing up a vessel prior to fumigation. All outlets to compartments to be fumigated are pasted up or covered with tarpaulin. Pictures show hatches battened down and covered over with tarpaulin, ventilators, skylights, port holes, lifeboats, etc. closed and sealed.

No. U.D.T.	Chinese	American	British	Danish	French and U.S.S.R.	Greek	Italian	Japanese	Netherlands	Norwegian	Total
Oct.	29 2 38,111	2 1,000	17 37,227	— —	— —	— —	1 1,500	4 6,000	2 12,356	— —	55 96,194
Nov.	28 1 26,104	1 500	14 17,438	— —	— 3,971	1 —	— 7,312	6 13,830	2 —	— —	52 69,155
Dec.	33 1 41,041	1 500	8 29,867	1 4,010	1 1,500	— —	1 500	2 2,468	5 30,130	3 11,527	55 121,543
Total	313 395,165	15 8,500	163 342,925	6 16,792	4 7,493	2 8,856	4 5,000	48 67,393	26 164,551	10 33,045	591 1,049,720

TABLE II

Comparison of No. and underdeck tonnage of fumigated vessels, 1934-36

Year	No. vessels	Underdeck tons	Dead rats
1934	654	1,590,243	2,409
1935	638	1,448,832	2,478
1936	591	1,049,720	1,402

TABLE III

Types of fumigants used

Year	SO ₂	CO & CO ₂	Z-B
1934	518	134	2
1935	533	104	1
1936	521	68	2

TABLE IV

Types of Certificates issued

Year	Deratization Certificates	Deratization Exemption Certificates	Total
1934	654	16	670
1935	638	37	675
1936	591	20	611

TABLE V

Classification of rats destroyed by fumigation

	<i>R.r.r.</i>		<i>R.r.a.</i>		<i>R.norv.</i>		<i>Gunomys</i>		<i>Mus</i>		<i>Total</i>
	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	
Jan. . . .	19	26	—	—	—	—	—	—	—	—	45
Feb. . . .	18	29	2	—	4	22	—	—	—	—	75
Mar. . . .	50	62	—	—	—	—	2	2	—	—	116
Apr. . . .	37	68	—	—	1	5	—	—	10	—	121
May	67	110	—	—	2	4	—	—	6	16	205
June	19	40	—	—	—	—	—	—	—	3	62
July	38	42	1	1	4	13	—	—	5	5	109
Aug. . . .	61	92	—	—	—	—	—	—	—	—	153
Sept. . . .	76	72	—	—	—	—	—	—	3	12	163
Oct. . . .	42	85	—	—	1	1	—	—	—	—	129
Nov. . . .	77	109	2	1	3	1	—	—	2	6	201
Dec. . . .	7	10	—	—	—	1	—	1	1	3	23
Total . .	551	745	5	2	15	47	2	3	27	45	1,402

TABLE VI

Classification of dead rats by ports

	<i>R.r.r.</i>		<i>R.r.a.</i>		<i>R.norv.</i>		<i>Gunomys</i>		<i>Mus</i>		<i>Total</i>
	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	<i>m.</i>	<i>f.</i>	
Local and River . .	227	385	2	1	10	39	—	—	5	12	681
South . .	201	236	2	—	—	5	2	2	6	19	473
North . .	59	104	—	—	5	2	—	—	2	1	173
Japan	9	5	1	—	—	1	—	1	—	—	17
South Seas..	7	9	—	1	—	—	—	—	6	8	31
Europe and America . .	8	6	—	—	—	—	—	—	8	5	27
Total . .	551	745	5	2	15	47	2	3	27	45	1,402

TABLE VII

Rats recovered from different types of vessels

Type of Vessel	Fumi- gant	L & R		South		North		Japan		S. Seas		E & A	
		V	R	V	R	V	R	V	R	V	R	V	R
Passenger	SO ₂	54	615	11	134	18	93	2	5	—	—	—	—
	CO-CO ₂	—	—	7	37	5	17	1	2	3	11	3	9
Cargo	SO ₂	12	40	19	230	4	36	1	3	2	7	2	11
	CO-CO ₂	5	26	17	72	6	27	3	7	4	13	3	7

TABLE VIII

Rats recovered before discharge of cargo

Ports	Local & River	South	North	Japan	South Sea	Europe & America
Vessels	9	27	29	5	17	9
Rats	43	141	62	10	26	16

TABLE IX

Disinfections done in 1936 (in packages)

	Vessels	Blankets	Mattress pillows	Old gunny bags	Old hats	Old cloth	Hairs	Old Clothing	Old Newspaper	Wool waste	Total
Jan. . . .	—	—	—	20	—	—	—	82	—	14	116
Feb. . . .	1	—	—	—	—	—	—	182	414	204	747
Mar. . . .	2	—	—	62	—	—	—	119	—	138	321
Apr. . . .	—	—	—	52	1	—	—	188	—	74	315
May	4	—	—	17	—	—	—	152	—	153	326
June	3	—	—	127	—	—	—	228	320	183	861
July	—	—	—	—	—	—	—	176	—	107	283
Aug. . . .	—	—	—	102	—	—	—	89	71	2	264
Sept. . . .	2	—	—	330	2	37	12	130	80	67	660
Oct. . . .	—	—	120	271	—	—	—	184	—	84	659
Nov. . . .	—	5	—	385	21	—	—	212	515	—	1,138
Dec. . . .	1	—	—	255	7	—	—	303	1,680	39	2,285
Total ..	13	5	120	1,621	31	37	12	1,991	3,080	1,065	7,975

MEDICAL SERVICES DIVISION IN 1936

BY J. W. H. CHUN (陳永漢)

Chief, Medical Services Division, Shanghai Quarantine Station

Although cholera and smallpox showed a definite increase in India, Siam and Burma during the first quarter of 1936 and although plague again made its appearance in the autumn in South Manchuria, Shanghai was more fortunate in that there were only 329 cases of smallpox with 87 deaths reported for the whole of 1936, while there were no cases of plague or cholera at all. In fact, smallpox has not been very prevalent for the last two years, while plague has been absent since 1915, and, except for three cases in 1934, no cholera has been reported since 1932. In passing, it may be permissible to note that coincident with this freedom from cholera, the previous winter and spring rainfall of each year has not been scanty. This is in accordance with Sir Leonard Rogers' observations in India, and it will be interesting to watch future records which may help to determine whether previous scanty rainfall has any effect on cholera or not.

While these three diseases have been more or less absent, certain others showed a tendency to increase. Among them particular mention may be made of malaria, enteric fever, dysentery and scarlet fever. Those which remained stationary were diphtheria, cerebro-spinal meningitis and tuberculosis (see Table I). Although the increase in malaria and enteric fever is causing some anxiety to the local health authorities, 1936 has been, on the whole, a healthy year.

DISEASES AND DEATHS ON BOARD VESSELS

Of quarantinable diseases, only one case of smallpox and one of suspected cholera were reported. Details of these are set forth in Table II. It will be seen that neither of these patients became infected while their respective ships were in harbour. In the first case (smallpox), the patient arrived from Nanking on April 25 and became ill on April 27. In the second case (suspected cholera), the patient left Hankow on May 9, fell ill on the same day and was

西北回民於赴麥加前種痘及受抗霍亂接種時之情形

Fig. 23. Vaccination of Chinese Mohammedan pilgrims prior to sailing for Jeddah en route to Mecca. They are also inoculated against cholera.



赴麥加回民由上海登船之情形

Fig. 24. Chinese Mohammedan pilgrims from the Northwest Provinces (Kansu, Ninghsia, etc.) boarding a pilgrim ship at Shanghai bound for Jeddah en route to Mecca.



於起程前在船上受檢驗之情形

Fig. 25. Chinese quarantine officers at Shanghai inspecting these pilgrims aboard ship just before sailing.

landed at Kiukiang for treatment, while the vessel on which he travelled proceeded on to Shanghai.

Of non-quarantinable infectious diseases there were 210 cases and 25 deaths. The list is headed by influenza (90 cases), while phthisis (36 cases) and gonorrhoea (29 cases) come second and third respectively. When a highly infectious disease like influenza makes its appearance among the crew living in close proximity on board a ship, it generally spreads rapidly. On the arrival of the R.M.S. Rajputana from Japan on January 19, it was found that between January 8-19, there had occurred 36 cases of influenza among the crew. Every day 3 to 4 cases made their appearance and on examination, 7 cases were still at the acute stage, the remainder being convalescent. Fortunately the cases were mild and all recovered. In September, 36 cases of influenza were found among the officers and crew of the cable ship Pacific. This meant that about half of the crew was incapacitated. After appropriate steps were taken the epidemic soon came under control.

VACCINATIONS AND ANTI-CHOLERA INOCULATIONS

Altogether 970 vaccinations were performed on passengers, crews and pilgrims. 211 anti-cholera inoculations were given, mostly to the crews of ships. As in former years members of the Quarantine Service were inoculated against cholera before the onset of summer.

Towards the end of the year 136 Chinese Mohammedan pilgrims (128 men, 6 women, 2 children) were vaccinated against smallpox and cholera before leaving for Mecca. It may be mentioned that out of 73 pilgrims who went away in 1935, only 70 returned to China on the s.s. *Agamemnon* on April 18, 1936, the remaining 3 having died on the way.

WOOSUNG QUARANTINE STATIONS

Both Quarantine Stations, Nos. 1 and 2, were maintained in efficient order and always kept ready to receive patients and contacts. The laboratory equipment has been made more complete, so that some research work may be carried out in 1937.

Nearby villagers continued to attend the Woosung clinic for treatment. 235 patients paid 417 visits during the year. Vaccinations and anti-cholera inoculations were also given to those who applied for them.

TABLE I

Summary of Some Notifiable Diseases in Shanghai, 1931-36

Diseases	1931				1932				1933				1934				1935			
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
Smallpox	232	135	678	293	350	109	637	243	58	10	329	87				
Cholera	404	41	4093	298	—	—	3	—	—	—	—	—	—	—	—	—
Plague	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhus	6	2	20	3	12	—	9	2	15	2	15	1				
Enteric Fever	231	332	677	367	988	570	1126	698	934	517	1097	574				
Dysentery	757	177	1077	102	1418	189	1840	257	860	152	1084	184				
Diphtheria	391	76	672	101	912	83	1290	150	1145	102	916	113				
Scarlet Fever	181	79	574	107	694	35	699	50	395	20	568	42				
C. S. Meningitis	165	186	191	76	322	130	350	101	210	67	182	71				
Malaria	170	15	216	13	244	19	202	22	486	17	829	49				
Tuberculosis	320	873	1270	1043	1523	1187	1609	1234	1570	1143	1507	1091				



回民所乘之藍烟囱輪船阿司法龍號

Fig. 26. The Blue Funnel s.s. *Asphalion* leaving Shanghai for Jeddah with a large number of Chinese Mohammedan pilgrims.



扶梯上之回民婦女，頭蒙網帕

Fig. 27. Female pilgrims coming up the gangway. Note the veils.



檢疫醫官於回民起程前檢
查人數並驗視種痘反應

Fig. 28. Chinese quarantine officers checking pilgrims and inspecting their vaccination reactions prior to departure.



TABLE II

Details of two cases of quarantinable diseases

Disease	Smallpox case	Suspected cholera case
Date	April 29, 1936	May 12, 1936
Name of vessel ..	Italian cruiser <i>Lepanto</i>	Lighter No. 14
Name of patient ..	Evarsto Romanini	Wang Shao-sheng
Age	21	40
Sex	Male	Male
Occupation . . .	Sailor	Sailor
History	Ship arrived from Nanking on April 25. Patient began to feel ill on April 27.	On way from Hankow (May 9), patient fell ill with severe vomiting and diarrhoea, severe cramps in both arms and legs and signs of dehydration. He was put ashore in Kiukiang for treatment.
Measures taken ..	Admitted into S.M.C. Isolation Hospital on April 29. Contacts, numbering 85 officers and crew, were vaccinated by ship's surgeon on April 30. Ship's Hospital and patient's personal effects were disinfected with formalin on April 29.	On arrival of the lighter at Shanghai on May 12, 55 contacts were inoculated against cholera and the crew's quarters were fumigated with formalin and water tank with potassium permanganate.
Remarks	The case was a mild one. Patient was last vaccinated on April 11, 1935.	Contacts remained healthy.

TABLE III
Diseases and Deaths on Board Vessels

Quarantinable Diseases		Non-quarantinable Infectious Diseases		Others	
Cases	Deaths	Cases	Deaths	Cases	Deaths
Smallpox	1	Influenza	90	Phthisis	19
Suspected cholera	1	Phthisis	36	Pneumonia	4
	—	Gonorrhoea	29	Dysentery	1
	2	Leprosy	9	Fever	1
		Pneumonia	7		—
		Chicken pox	6		25
		Malaria	4		
		Cold	4		
		Syphilis	3		
		Bronchitis	3		
		Soft chancre	3		
		Conjunctivitis	3		
		Tonsillitis	2		
		Measles	2		
		Paratyphoid	2		
		Mumps	2		
		Dysentery	1		
		German measles	1		
		Typhoid	1		
		Erysipelas	1		
		Fever	1		
			—		
			210		

TABLE IV
Vaccinations and Anti-cholera Inoculations

Vaccination of passengers and others	Examination and vaccination of ship's crew	Vaccination and anti-cholera inoculation of Chinese Mohammedan pilgrims	Anti-cholera Inoculation	Anti-typhoid inoculation
754	211	80	136	7

AMOY QUARANTINE STATION

ANNUAL REPORT FOR 1936

By F. S. WONG (王拱辰)

Senior Quarantine Officer-in-charge

It is gratifying to be able to look back on another year during which there were no epidemics of any of the major infectious diseases. With the exception of sporadic cases of smallpox, cerebro-spinal meningitis and diphtheria there is nothing of special interest in the disease records.

As each year passes, we find the cordial relations, which have always existed between the Station and the various bodies with which it comes in contact, more firmly cemented. This is a source of great satisfaction.

As evidence of the growth and increased activities of this Station, we are pleased to be able to report the erection of new offices and the acquiring of a new motor boat. The new building, which is situated at the south end of the Bund, not only commands a good view of the harbour but also of the signal station and outer harbour. Here the facilities for the examination and vaccination of emigrants are a vast improvement on those which existed previously. The different groups, such as those for Singapore, Manila and Java, can be segregated and, as the routine differs in each case, depending upon the destination of the emigrant, the work can be carried out much more smoothly.

From the point of view of the emigrants themselves there are definite advantages, not the least of which is the fact that, with the increased space available for them, they will no longer have to wait outside in possibly inclement weather, when there happens to be a large number to be inspected.

There is also a well-equipped and up-to-date laboratory where any necessary bacteriological work can be performed immediately.

Realizing that a happy, healthy and contented staff is also an efficient one, no efforts have been spared to make things as pleasant as possible. In addition to the airy and well-ventilated offices there is also a reading and recreation room for the use of the staff during their leisure moments.

The new motor boat, which is smaller than the old one, will be used for fumigation work and other duties in the inner harbour, while the other is reserved for quarantine inspections in the outer harbour.

As in previous years we kept ourselves in constant touch with the Eastern Bureau of the League of Nations' Health Organisation, Singapore, by weekly postal communications and, in case of emergency or special information, by exchange of cables. The weekly or monthly returns of communicable diseases from the following authorities were received regularly:—

Eastern Bureau, Singapore.
Eastern Bureau, weekly bulletin, broadcast from Saigon and distributed by our Headquarters, Shanghai.
Medical & Sanitary Services, Hongkong.
Public Health Department, Manila, P.I.
Health Department, Shanghai Municipal Council, Shanghai.
Shanghai Quarantine Station and other outport stations under the National Quarantine Service.
Public Health Department, Amoy.
Kulongsu Municipal Council, Amoy.

QUARANTINE ACTIVITIES

During the year no quarantine restrictions were imposed against any foreign or coastal port. It will be seen from Tables V and VI that 283 vessels with an aggregate gross tonnage 1,518,834 were inspected at the Quarantine Anchorage. Ships flying the British flag again head the list with 150, followed by the Netherlands with 78, Norwegian, 26, Japanese 23, Chinese and Danish 3 each. The total number of foreign and Chinese passengers carried on these ships was 49,459, the distribution being as follows: British vessels 23,938, Netherlands 22,619, Norwegian 1,259, Japanese 1,455, and Danish 188.

Table IV shows the total number of vessels excluding men-of-war and transports entering from (1,234 and G.T. 2,496,616) and clearing for (1,214 and G.T. 2,491,106) foreign and Chinese ports during the year.

FUMIGATION

As mentioned in last year's report, the new Customs Regulations regarding the fumigation of vessels, resulted in an increase in the activities of our fumigating division.

A reference to Table XII shows that a total of 14 steam and motor ships with an aggregate net tonnage of 27,301, and 127 steam launches were fumigated during the year. The number of rats recovered after fumigation was 165 from the big vessels and 38 from the launches.

廈門海港檢疫所
新廈之外觀

Fig. 29. The new six-storey concrete building of the Amoy Quarantine Station, completed in Dec. 1936. Situated on the Bund it houses offices, staff quarters, laboratory and emigrants' examination rooms.



新廈為廈門海濱
最高之建築

Fig. 30. View of the new building from the harbour. It is the tallest structure on the Bund, Amoy.

廈門海港檢疫所新建移
民收容所之正面

Fig. 31. Front view of the new Emigrants' Home of the Amoy Quarantine Station at Amoy Kang.



EMIGRATION

The number of emigrants who left Amoy during the year was approximately the same as for the preceding 12 months, being a few hundred less.

Tables I and II show that a grand total of 3,904 cabin and 60,366 deck passengers left on 234 sailings of emigrant vessels, the distribution being as follows:—to Singapore, F.M.S. and Burma, 1,619 cabin and 35,258 deck passengers; to Manila 946 cabin and 12,260 deck, while the remaining 1,339 cabin and 12,448 deck went to the Netherlands Indies. The number of emigrants going to Singapore was less than for the previous year, but this was compensated for by an increase in emigrants going to Manila. Of the emigrant vessels 131 sailed for Singapore, 52 for Manila and 51 for Java ports.

The number of persons rejected as unfit to travel was 733. That this number was so high was due to the fact that, early in the year, the Singapore authorities were very particular about the condition of the eyes of all emigrants, so that, to avoid any trouble or delay at the other end, we rejected along with obvious cases of trachoma, all those about whom there was any doubt.

A study of Table III shows that over 50 per cent were rejected on account of trachoma. Other common causes of rejection were fever, favus, morphinism and leprosy. The list of rejections does not include those who were found physically unfit at the primary examination held in the offices.

During the few months that the Singapore authorities were so strict, the number of rejects on some of the ships was so large that a great deal of inconvenience was caused to the shipping companies before these rejects could be returned to the shore. To obviate this we decided to institute a system of inspection at the office before the passenger was vaccinated. If, at this inspection, he is regarded as fit to travel he is given an identification card to which he attaches his photograph; he is then vaccinated. By arrangement with the shipping brokers, the prospective emigrant cannot be sold a ticket till he produces his identification and vaccination card. This greatly facilitates the usual routine examination which is still carried out on board the vessel just prior to its departure. Table VII shows that during the year 66,647 vaccinations were done at this Station.

Towards the end of the year we had a visit from Dr. R. D. Fitzgerald, Director of Medical Services, Singapore. The object of his visit was to secure our co-operation in the attempts of the Singapore authorities to prevent the influx of early cases of leprosy from China, particularly from Swatow. Although detection of early

cases is by no means easy, we have always been on the look-out for any signs of this disease, and all suspicious cases are rejected. That we have kept a sharp look-out for all possible causes of rejection can be seen from a study of Table III, which shows how many were rejected and the diseases which caused their rejection.

We would like to point out that although a large number are rejected, this does not mean that their chances of emigrating are gone forever. All rejects are given the opportunity (and most of them avail themselves of it) of going to the Emigrants' Home where they are given free residence and treatment. As a result a large majority after varying periods of time are cured and given permission to sail.

QUARANTINE HOSPITAL

During the year only 54 cases of infectious diseases were admitted to the Quarantine Hospital, as compared with 70 admitted in 1935. A study of Table VIII shows that the two most prevalent diseases were diphtheria and cerebro-spinal meningitis. There was only one case of smallpox as compared with 14 for the previous year.

It is interesting to note the occurrence of 8 cases of encephalitis, 6 of which died. During the year there were a number of patients on Kulongsu suffering from this disease, most of whom died. Although it is unusual to meet the disease here, this year there seems to have been a mild epidemic.

During the year we started an out-patient clinic at the hospital where treatment is given free to those who cannot afford private medical attention. From July to December, 238 patients paid 941 visits. We also decided to convert one of the wards of the Emigrants' Home for the use of patients suffering from non-infectious diseases.

Early in the year a visit was paid to the hospital by Dr. Stampar, who had been sent out to China by the League of Nations to investigate rural health conditions. He commented very favourably upon conditions at the hospital, and was impressed by the care and attention which was given to the rejects in the Emigrants' Home.

RAT-FLEA SURVEY

Table X shows the results of the rat—flea survey carried out in Amoy during the year. *R. norvegicus* was the commonest species of rat found, with the *X. cheopis* again predominating among the fleas.

Both the flea index and *cheopis* index were higher than for the previous 12 months, the former being 4.0 as compared with 3.7 for 1935, while the *cheopis* index was 2.6 as compared with 1.9.

HEALTH OF THE PORT

The health of the port was, on the whole, very satisfactory. Table IX shows the incidence of communicable diseases in 1936. A comparison of this table with that for the previous 12 months shows that in 1936 there was a reduction of 50 per cent in the number of cases of infectious disease while the total death rate was reduced by about 60 per cent. There were no cases, either imported or local, of cholera or plague. There were only 9 cases of smallpox. The most noticeable reduction, however, was in the typhoid, paratyphoid and dysentery groups. Although the number of diphtheria patients was about the same, it is gratifying to note that cerebro-spinal meningitis was not nearly so prevalent.

The health of the neighbouring island of Kulongsu was also satisfactory. As usual, the commonest causes of death were convulsions, debility, pneumonia, pulmonary tuberculosis and the typhoid-dysentery group. As in the case of Amoy it is gratifying to be able to report a reduction in the incidence of this latter group.

The clinic for poor children, the establishment of which was mentioned in last year's report, has more than justified the enterprise of the Rotary Club which was responsible for it. During the summer months especially, the parents have realized its value and have not failed to avail themselves of the facilities it offers for the care and treatment of children.

In conclusion, I would like to place on record my appreciation of the help and co-operation of every member of the Amoy staff, especially during the time of inauguration of the Swatow Station, when Amoy was left rather short-handed owing to some of the staff being seconded for duty in Swatow. During this period, however, despite the depleted staff, the co-operation of all the members enabled the Service to carry on as usual.

I am particularly grateful to the Director and almost the entire staff of the Shanghai Quarantine Station for their assistance which has made it possible for me to look after the Swatow Station as well.

I would also like to mention the success gained during the year by a former member of our staff, Dr. F. G. Fenton, who was successful in obtaining his F.R.C.S. England. All his former associates here join in offering him their heartiest congratulations and best wishes for a successful future.

TABLE I
Emigrants inspected in 1936

Month	No. Vessels	Cabin			Deck			Hongkong &/or Swatow Rejects	
		M.	W.	C.	M.	W.	C.	Rejects	
FOR SINGAPORE									
January	9	14	10	14	1,424	224	204	77	2
February	12	43	31	22	1,912	403	395	231	13
March	13	54	44	63	2,859	646	595	232	52
April	10	42	36	33	2,138	474	405	96	292
May	10	99	43	49	1,792	411	352	121	85
June	10	87	46	57	1,933	522	464	84	32
July	13	83	32	38	2,161	489	440	184	32
August	12	56	50	41	2,026	459	385	124	27
September	11	38	18	16	1,429	454	412	65	11
October	9	84	49	49	2,134	615	491	153	30
November	12	51	25	26	2,082	552	470	91	20
December	10	62	61	53	2,146	728	632	89	16
Total	131	713	445	461	24,036	5,977	5,245	1,547	612
FOR MANILA P.I.									
January	5	15	19	20	336	78	77	0	0
February	4	21	20	22	544	46	95	0	2
March	5	22	29	20	1,022	101	219	0	5
April	4	14	22	19	669	72	113	0	17
May	5	34	58	41	1,229	179	248	0	14
June	4	29	33	14	856	75	186	0	5
July	4	21	21	20	524	97	131	0	6
August	5	25	42	40	559	98	192	0	3
September	4	30	26	22	595	66	147	0	6
October	4	26	28	12	919	133	192	0	3
November	2	12	15	15	489	63	120	0	4
December	6	49	49	41	1,677	193	320	0	17
Total	52	298	362	286	9,419	1,201	2,040	0	82
FOR JAVA, N.E.I.									
January	4	35	14	9	178	41	56	145	0
February	4	62	38	12	810	158	208	268	0
March	4	44	40	16	932	188	183	174	0
April	4	64	58	23	1,231	178	180	189	16
May	5	73	59	32	1,063	172	166	205	5
June	4	62	48	13	706	138	128	117	6
July	4	78	38	11	662	149	154	218	1
August	5	47	22	19	548	134	153	442	0
September	4	39	19	14	425	99	124	198	4
October	5	63	43	35	751	166	167	244	1
November	4	57	46	17	763	146	160	221	1
December	4	49	32	8	822	142	167	273	5
Total	51	673	457	209	8,891	1,711	1,846	2,694	39

TABLE II
Summary of Table I
FOR SINGAPORE

Total Sailings	Cabin Pass.	Deck Pass.	Rejects
131	Men 445 Women 461 Children	713 } 1619 5977 } 24036 } 35258 5245 } 612	
	FOR MANILA P.I.		
52	Men 362 Women 286 Children	298 } 946 1201 } 9419 } 12660 2040 } 82	
	FOR JAVA, N.E.I.		
51	Men 457 Women 209 Children	673 } 1339 1711 } 8891 } 12448 1846 } 39	
	Grand Total:	Sailings: 234 Cabin Pass. 3904 } Deck Pass. 60366 } 64270 Rejects: 733	

TABLE III
Conditions causing rejection of emigrants in 1936

Disease	No.	Disease	No.
Trachoma	465	Ringworm	5
Fever	52	Chicken-pox	2
Favus	34	Measles	2
Morphinism	16	Malarial cachexia	2
Leprosy	12	Senile debility	1
Scabies	8	(Accompanying rejects)	134
		Total	733

TABLE IV
*No., tonnage and nationalities of vessels entering and clearing
Amoy harbour in 1936*

Nationality	ENTERED			
	Foreign Countries		Chinese Ports	
	No.	Net Ton.	No.	Net Ton.
British	213	579,483	374	638,558
Chinese	7	9,074	168	148,463
Danish	2	2,884	4	6,956
French	—	—	1	2,047
Japanese	120	207,969	172	234,150
Netherlands	65	320,695	75	290,828
Norwegian	4	5,783	29	49,726
Total	411	1,125,888	823	1,370,728

Nationality		Cleared		Chinese Ports	
		No.	Net Ton.	No.	Net Ton.
British	...	187	461,380	401	760,220
Chinese	...	27	32,382	130	119,471
Danish	...	3	4,623	3	5,217
French	...	—	—	1	2,047
Japanese	...	138	238,109	152	204,374
Netherlands	...	81	376,733	58	231,041
Norwegian	...	5	7,826	28	47,683
Total	...	441	1,121,053	773	1,370,053

TABLE V
Vessels inspected at Quarantine Anchorage in 1936

Month	Nationality	No.	Gr. Ton.	Passengers		
				Foreign	Chinese	Crew
January	British	17	87,770	75	2,724	2,196
	Chinese	2	4,346	—	—	122
	Japanese	1	4,382	51	1	59
	Netherlands	6	41,472	27	1,640	802
	Norwegian	2	6,177	—	172	136
Total	...	28	144,147	153	4,537	3,315
February	British	11	61,074	87	1,613	1,450
	Danish	1	3,110	—	76	98
	Japanese	2	11,644	127	1	148
	Netherlands	6	41,324	36	1,705	821
	Norwegian	1	3,616	—	61	77
Total	...	21	120,768	250	3,456	2,594
March	British	14	74,795	127	2,159	1,773
	Chinese	1	1,783	—	—	41
	Japanese	2	10,168	128	1	132
	Netherlands	7	47,136	35	1,887	921
	Norwegian	2	6,267	2	80	150
Total	...	26	140,149	292	4,127	3,017
April	British	13	66,841	126	2,386	1,696
	Japanese	2	8,052	71	3	195
	Netherlands	6	41,627	58	2,024	810
	Norwegian	2	6,177	—	135	168
Total	...	23	122,697	255	4,548	2,869
May	British	13	72,607	152	1,768	1,607
	Japanese	3	13,838	192	2	197
	Netherlands	7	49,275	43	1,754	926
	Norwegian	2	4,959	—	26	116
Total	...	25	140,679	387	3,550	2,846

Month	Nationality	No.	Gr. Ton.	Passengers		Crew
				Foreign	Chinese	
June	British	12	54,966	73	2,736	1,548
	Japanese	2	7,978	81	4	122
	Netherlands	6	40,022	68	1,392	806
	Norwegian	2	6,177	—	113	157
Total	...	22	109,143	222	4,245	2,633
	...	—	—	—	—	—
July	British	12	64,409	60	1,545	1,493
	Danish	1	1,739	0	69	95
	Japanese	2	8,052	89	0	124
	Netherlands	7	45,953	19	1,744	952
	Norwegian	3	8,539	4	111	179
Total	...	25	128,692	172	3,469	2,843
	...	—	—	—	—	—
August	British	10	57,486	131	1,333	1,347
	Danish	1	1,739	—	43	96
	Japanese	2	11,644	230	7	150
	Netherlands	6	41,447	30	1,729	814
	Norwegian	3	7,348	1	58	183
Total	...	22	119,664	392	3,170	2,590
	...	—	—	—	—	—
September	British	14	65,043	91	1,563	1,712
	Japanese	1	5,785	15	—	76
	Netherlands	7	50,855	33	1,905	922
	Norwegian	2	6,177	—	127	144
Total	...	24	127,860	139	3,595	2,854
	...	—	—	—	—	—
October	British	10	49,337	33	1,729	1,263
	Japanese	2	8,052	114	—	123
	Netherlands	7	49,249	45	2,252	935
	Norwegian	2	6,177	—	104	148
Total	...	21	112,815	192	4,085	2,469
	...	—	—	—	—	—
November	British	10	50,280	48	1,390	1,277
	Japanese	1	2,193	—	—	48
	Netherlands	7	49,362	36	2,192	934
	Norwegian	2	6,177	1	142	120
Total	...	20	108,012	85	3,724	2,379
	...	—	—	—	—	—
December	British	14	82,014	37	1,952	1,809
	Japanese	3	13,844	237	1	200
	Netherlands	6	41,446	19	1,946	811
	Norwegian	3	6,904	—	122	179
Total	...	26	144,208	293	4,021	2,999
	...	—	—	—	—	—

SUMMARY

Nationality	No.	Gr. Ton.	Passengers		
			Foreign	Chinese	Crew
British	150	786,622	1,040	22,898	19,171
Chinese	3	6,129	0	0	163
Danish	3	6,588	0	188	289
Japanese	23	105,632	1,435	20	1,574
Netherlands	78	539,168	449	22,170	10,454
Norwegian	26	74,695	8	1,251	1,757
Total	283	1,518,834	2,932	46,527	33,408

TABLE VI

Summary of Table V

Month	No. Vessel	Gr. Ton.	Passengers		
			Foreign	Chinese	Crew
January	28	144,147	153	4,537	3,315
February	21	120,768	250	3,456	2,594
March	26	140,149	292	4,127	3,017
April	23	122,697	255	4,548	2,869
May	25	140,679	387	3,550	2,846
June	22	109,143	222	4,245	2,633
July	25	128,692	172	3,469	2,843
August	22	119,664	392	3,170	2,590
September	24	127,860	239	3,595	2,854
October	21	112,815	192	4,085	2,469
November	20	108,012	85	3,724	2,379
December	26	144,208	293	4,021	2,999
Total	283	1,518,834	2,932	46,527	33,408

TABLE VII

No. of smallpox vaccinations in 1936

Month	No.	Month	No.
January	1,892	July	4,191
February	5,651	August	4,508
March	7,571	September	4,262
April	6,273	October	5,786
May	7,054	November	7,018
June	5,224	December	7,217
		Total	66,647

TABLE VIII

Admissions into Quarantine Hospital in 1936

Diseases	Cases	Deaths	Diseases	Cases	Deaths
Measles	2	1	Cerebro-spinal meningitis	14	6
Smallpox	1	1	T. B. meningitis	2	2
Diphtheria	19	7	Sunstroke	2	0
Encephalitis	8	6	Tonsillitis	2	0
Bacillary Dysentery	1	1	Typhoid fever	2	2
Acute gastro-enteritis	1	0			
			Total	54	26
				—	—

Admissions into Emigrants' Home in 1936

Diseases	Cases	Diseases	Cases
Trachoma	143	Gastritis	1
Blepharitis	1	Acute gastro-enteritis	1
Favus	3	Influenza	1
Scabies	1	Infected wound	1
Ringworm	1	Amoebic dysentery	1
		Total	154
			—

Quarantine Hospital O.P.D. (July-December, 1936)

Total number of cases	...	...	...	...	...	...	...	...	...	...	238
Total number of visits	...	...	...	...	...	...	...	...	...	...	941

TABLE IX

Communicable diseases reported in Amoy in 1936

Diseases	Cases	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Plague	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cholera	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Smallpox	—	2	—	1	—	3	3	—	—	—	—	—	—	9
—	—	2	—	1	—	2	3	—	—	—	—	—	—	8
C. Spinal Meningitis	6	6	5	2	3	2	1	2	—	1	—	1	—	29
Yellow Fever	3	3	2	1	3	2	1	1	—	1	—	—	—	17
Diphtheria	10	6	9	—	9	3	—	—	2	1	6	3	—	49
—	4	1	2	—	5	2	—	—	2	—	3	1	—	20
Scarlet Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhoid & Paratyphoid	16	13	2	—	—	—	9	10	7	11	5	1	—	74
Dysentery- Amoebic & Bacillary	7	6	2	—	—	—	4	3	5	2	3	—	—	32
Typhus Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	33	28	16	3	12	8	23	13	11	14	14	5	180	
	15	12	6	2	8	6	14	5	8	4	8	1	89	

TABLE X

Rat-flea Survey, 1936

<i>Date:</i>	<i>Jan.-December, 1936</i>					
<i>Where Trapped:</i>						
City	...	...	...	197		
Amoykang	...	...	...	96		
Hosan	...	...	...	2		
Kulangsu	...	...	...	1		
				—		
	Total	...	...	296		
				—		
<i>Species of Rats:</i>				<i>M.</i>	<i>F.</i>	<i>Total</i>
<i>R.r. rattus</i>	...	...	...	9	51	60
<i>R.r. alexandrinus</i>	...	...	...	4	2	6
<i>R.r. rufescens</i>	...	...	...	4	4	8
<i>R. norvegicus</i>	...	...	...	87	133	220
<i>Musk shrew</i>	...	...	...	1	1	2
				—	—	—
	Total	...	...	105	191	296
				—	—	—
<i>Fleas Recovered:</i>				<i>M.</i>	<i>F.</i>	<i>Total</i>
<i>X. cheopis</i>	...	...	...	283	495	778
<i>L. musculi</i>	...	...	...	146	240	386
<i>Cer. anisus</i>	...	...	...	14	25	39
<i>Ct. canis</i>	...	...	...	1	1	2
<i>Ct. felis</i>	...	...	...	0	1	1
				—	—	—
	Total	...	...	444	762	1,206
				—	—	—
<i>No. of Rats Without Fleas:</i>	...	...	...	...	...	110
<i>No. of Dead Rats:</i>	...	...	...	...	...	166
<i>Flea Index:</i>	...	...	...	...	...	4.0
<i>Cheopis Index:</i>	...	...	...	...	...	2.6

TABLE XI

Vessels fumigated and rats recovered in 1936
STEAM AND MOTOR SHIPS

<i>Month.</i>	<i>Nation.</i>	<i>No.</i>	<i>Net Ton.</i>	<i>Rats Recov.</i>
January	Chinese	...	1,414	3
February	Danish	...	1,739	3
March	British	...	7,065	22
April	British	...	2,080	21
	Norwegian	...	1,445	—
May	British	...	2,525	9
June	Norwegian	...	2,160	46
October	British	...	1,869	23
	Norwegian	...	1,445	18
November	Chinese	...	1,005	1
December	Norwegian	...	2,267	19
	British	...	2,287	—
		—	—	—
Total	...	14	27,301	165
		—	—	—

LAUNCHES

Month.	Nation.	No.	Rats Recov.
January	Chinese	4	—
February	„	3	—
March	„	4	2
April	„	47	20
	Japanese	2	—
May	Chinese	10	—
June	„	5	—
July	„	3	1
August	„	2	1
October	„	40	7
	Japanese	2	4
November	Chinese	4	—
December	„	1	3
		—	—
Total	...	127	38
		—	—

SUMMARY

Nation.	No.	Net Ton.	Rats Recov.
<i>Steam and Motor Ships</i>			
British	7	15,826	75
Chinese	2	2,419	4
Danish	1	1,739	3
Norwegian	4	7,317	83
	—	—	—
Total	14	27,301	165
	—	—	—
<i>Launches</i>			
Chinese	123	34	—
Japanese	4	4	—
	—	—	—
Total	127	38	—
	—	—	—

TSIN-TANG-CHIN QUARANTINE STATION

ANNUAL REPORT FOR 1936

By FUNG YUN-FAT (馮潤發)

Quarantine Officer-in-charge

The reorganization of the three northern quarantine stations at Tientsin, Tangku-Taku and Chinwangtao into one unit was effected in 1936 by the National Health Administration. The quarantine officer-in-charge of the old Tangku-Taku Station was appointed chief of the new Tsin-Tang-Chin Station, and the quarantine officers resident at Tientsin and Chinwangtao were made directly responsible to him for the conduct of their respective Stations. Excepting for this administrative change, routine work in the three ports was carried out in accordance with the practice of former years.

The following is a summary of the new Station's activities for the year 1936. The individual reports that follow are based upon the accounts submitted by the officers resident in the three ports.

SUMMARY OF ACTIVITIES

1. The Taku quarantine hospital suffered severely as a result of the forcible occupation of the grounds and buildings in May. It is hoped that the responsible authorities will see fit to return the property to its rightful owners.

2. The population of Tangku and Taku received free vaccinations and anti-cholera inoculations from us during the year. In Tientsin this service was performed by charitable hospitals and institutions, while in Chinwangtao the K.M.A. and Railway hospitals made themselves responsible.

3. Routine fumigation and disinfection at Tangku and Tientsin were carried out by the Tangku staff, in accordance with international practice. No fumigations were conducted at Chinwangtao in 1936.

4. Thirteen vessels arrived at Taku with corpses on board, one at Tientsin; the necessary measures were taken.

5. We issued 26 Bills of Health to outgoing vessels at Tientsin, 28 at Chinwangtao and 1 at Tangku.

6. A total of 24 vessels were boarded and inspected after daylight hours at Chinwangtao during the year. Owing to the peculiar conditions at Tientsin and Tangku, night inspection of arriving vessels



大沽海港檢疫醫院之頭等病房
(現被天津市政府借用)

Fig. 32. Taku Quarantine Station, showing 1st Class block. Now forcibly occupied by the Tientsin Mayor.

大沽隔離所

Fig. 33. Taku Quarantine Station, 3rd Class Quarters.



大沽辦事處及醫官住宅

Fig. 35. Sub-office and Staff Quarters at Taku.



could not be satisfactorily undertaken at these two ports, and was therefore not attempted.

7. During the year under review, 154 vessels totalling 495,408 gross tons and carrying 7,054 crew and one passenger were boarded and granted pratique at Chinwangtao. No quarantinable diseases were reported or found on vessels arriving at the three ports.

8. In compliance with the official regulations governing importation of old newspapers, rags, second-hand clothing, old gunny bags, cotton and wool waste, etc., importers of these articles were required to produce disinfection certificates issued by a recognized health authority, failing which disinfection was carried out by us before landing was permitted. During 1936, 7,788 bales of gunny bags, 1,645 bales of old newspaper, 7,561 bales of rags, 531 bales of old wool waste, and 2 bales of old mosquito netting were imported into Tientsin: these were covered by 825 disinfection certificates. Tangku imported 1,000 bales of old newspaper, 110 bales of gunny bags and 47 bales of old cotton waste covered by 16 disinfection certificates.

9. The rat flea survey at Tangku and Chinwangtao was continued. In 1936, 404 rats were trapped in Tangku-Taku and 600 in Chinwangtao for the purpose of the survey. Only one species has so far been recovered, viz. *Rattus norvegicus*. Of 1,062 fleas examined at Tangku, 816 were *X. cheopis* and 246 *Ceratophyllus anisus*. Of 949 fleas recovered in Chinwangtao, 730 belonged to the former species and 219 to the latter.

TANGKU-TAKU

(Q.O.-in-charge: FUNG YUN-FAT 馮潤發)

Medical inspection of vessels

There was no routine examination of vessels arriving from foreign ports during the year. No Chinese or foreign ports were declared infected. Thirteen vessels arriving with corpses on board were inspected. Of the deaths, 4 were through heart failure, 2 phthisis, 2 morphinism, and 1 each rheumatism, gastric disease, coal gas poisoning, hepatic disease and malaria. Of the vessels, 5 were Chinese, 5 British and 3 Japanese. Ten of the corpses were buried in our Station cemetery, while three were sent to their homes at the request of relatives. Before pratique was granted, the quarters occupied by the deceased were fumigated with sulphur dioxide or formalin gas.

Export of coffins

Of 10 certificates issued for the export of coffins in 1936, 5 covered shipment of corpses to Canton, 4 to Shanghai and 1 to Chefoo. Included in the shipments were sets of skeletons, one set being sent

by parcel post with the consent of the postmaster. The causes of death were: pulmonary tuberculosis (5), gastric disease (2), typhoid, senile debility and liver disease (1 each).

Bills of health

As the principal shipping agencies are located in Tientsin, applications for outward bills of health are usually made at our Tientsin office. Consequently, only one such document was issued at Tangku during the year—to the U.S.S. "J. D. Edwards," 1,500 regd. tons, bound for Chefoo with a complement of 128 officers and men.

Importation of old newspapers, etc.

Since the promulgation of regulations governing importation of old newspaper, rags, cotton waste, wool waste, old gunny bags, etc. in December 1935, importers and consignees have been required to produce disinfection certificates issued by recognized health authorities, failing which the goods were disinfected by the quarantine authorities. Between January and April 1936, 47 bales of old cotton waste, 110 bales of old gunny bags and 1,000 bales of old newspaper were imported into Tangku from Japan, all covered by disinfection certificates. From May to the end of the year, consignees dealt with our Tientsin office as the consignments were destined for the Tientsin market. The practice of using old newspapers for wrapping food products, so universal in this country, is to be strongly condemned, both from the hygienic and aesthetic points of view. There is no reason why the proper type of paper could not be cheaply and hygienically manufactured in this country.

Motor launch "Chang Chien"

A powerful motor launch "Chang Chien," specially designed for quarantine work in Tangku and Taku, was built in Shanghai and shipped to Tangku early in 1936. It is fitted with a Gardner L3 diesel engine and is capable of a working speed of 8½ knots. A dynamo supplies electricity for lighting and heating. Fumigation work at Tientsin has been greatly facilitated as the launch does the journey from Tangku in less than four and a half hours.

Thanks are due to the Harbour Master, Captain D. Lettington, for kindly permitting the laying of a mooring buoy near our Taku quarantine jetty. This enables our launch when tied up at the buoy to be easily accessible from our Station. Mr. A. Carter, agent of the Kailan Mining Administration, has also kindly allowed our launch to moor alongside the K.M.A. Tangku coal wharf whenever necessary.

Fumigation work

During the year under review, 63 vessels were fumigated with sulphur dioxide gas and 2 with formalin gas. The gross tonnage

totalled 86,530. The vessels comprised cargo and passenger ships plying between Tientsin, Japan and other ports on the China coast. Of these 52 were Chinese, 6 British, 4 Japanese, and 1 French. The duration of fumigation was from 6 to 12 hours. After fumigation 138 dead rats were recovered. *R.r.rattus* accounted for 41, *R.r.alexandrinus* 10, and *R.norvegicus* 87. Examination for plague proved negative. 29 of the vessels were fumigated in Tangku, 9 at Taku and 25 in Tientsin harbour.

TABLE I

Showing Number, Tonnage and Nationality of Vessels Fumigated

Mth.	No. vessels	Tonnage		French	Total
		Chinese	British		
January		4 6,151			4 6,151
February		1 1,687			1 1,687
March		7 12,579		1 2,531	8 15,110
April		3 1,481		1 1,177	5 2,742
May		4 3,269			4 3,269
June		6 6,826	2 5,281		8 12,107
July		4 4,459	1 2,483	1 188	6 7,130
August		1 1,469			1 1,469
September		1 2,454	1 2,489		2 4,943
October		6 7,436	1 1,460		7 8,896
November		7 7,786		1 1,177	8 8,963
December		8 11,265	1 2,798		9 14,063
Total		52 66,862	6 14,511	4 5,073	63 86,530

TABLE II

Showing classification of rats collected from various ports

	Canton	Shanghai	Newchwang	Lungkow	Other Ports	
<i>R. r. rattus</i>	6	16	10	—	—	9
<i>R. r. alexandrinus</i>	—	—	—	—	—	10
<i>R. norvegicus</i>	50	18	6	9	—	4
Total	56	34	16	9	—	23

Rat-flea survey

This work has continued uninterruptedly since August 1932. A total of 404 rats were trapped for the purposes of the survey as against 621 in 1935. The trade depression, causing the closure of many shops in Tangku and Taku in which our traps were set, may be held responsible for the decreased figures. The following figures give a summary of the survey:—

Rats: 404:

Dead rats found in traps: 31 (7.67%).
 Rats without fleas: 93 (23%).
 Sex ratio: 206 males, 198 females (12 pregnant; 76 foetuses).
 No signs of plague.
 Many parasites in livers of about 25% rats.
 None of the godowns trapped are rat-proof.
 Harbour area provided 29 rats, villages 375.
 Only *R. norvegicus* recovered.
 Trap-days totalled 15,082; average daily no. traps 41.2.
 No. of rats caught per 100 traps: 2.61.

Fleas: 1062:

X. cheopis: 816 (76.84%).
Cerat. anisus: 246 (23.16%).
 General index: 2.5; *Cheopis* index: 1.89 (max. Aug. 3.47; min. Mar. 0.66).

Vaccinations and inoculations

Free vaccination against smallpox was conducted between March and June by four stations opened by the Service. A total of 1,931 persons, of whom 1,257 were males, were vaccinated, including 963 individuals who were done for the first time.

Following the practice of former years, cooperation was established with the Bureau of Public Safety, the Railways and Yung Lee & Co. for the inoculation campaign against cholera, which began at the end of June and terminated in September. Altogether 2,224 inoculations were given (15,511 in Taku and 713 in Tangku).

Population and vital statistics

The latest census conducted by the Bureau of Public Safety showed the following figures:

TABLE III

Tangku-Taku census figures

<i>Location</i>		<i>No. houses</i>	<i>No. persons</i>
Tangku	.. .. .. .. ..	3,844	19,527
E. Taku	.. .. .. .. ..	4,172	21,366
W. Taku	.. .. .. .. ..	2,748	14,234
			<hr/>
Total	.. .. .. .. ..	10,764	55,127

TABLE IV

Births and deaths, 1936

Births: males 52; females 34; total 86.

Deaths: males 48; females 40; total 88.

Taku Quarantine Hospital

There were 54 admissions to our hospital during the year. Diseases treated were: eye 6; E.N.T. 3; abscesses 7; arthritis 5; gastro-intestinal 5; skin 15; malaria 1; periostitis 1; accidents (inc. wounds) 9; respiratory 2.

Notifiable diseases

No major infectious diseases were reported during the year (smallpox and cholera were both absent). Dysentery claimed 94 individuals, of whom 90 suffered from the bacillary type and 4 from the amoebic. Measles accounted for 12 patients, diphtheria for 7, scarlet fever for 2, and typhoid fever for 2, making a total of 117 cases of notifiable diseases reported. There were no deaths.

Vessels entering and clearing in 1936

Table V gives the number, nationalities and tonnages of vessels entering and clearing the port during the year.

TABLE V

Number of vessels entering and clearing the port, 1936

<i>Flag</i>	<i>Entered</i>		<i>Cleared</i>		<i>Total</i>	
	<i>No.</i>	<i>Tons</i>	<i>No.</i>	<i>Tons</i>	<i>No.</i>	<i>Tons</i>
American	20	78,243	20	78,243	40	156,486
British	438	856,620	438	857,611	876	1,714,231
Chinese	729	589,534	677	554,512	1,406	1,144,046
Danish	1	2,785	1	2,785	2	5,570
French	3	2,428	3	2,428	6	4,856
German	50	219,355	53	233,216	103	452,571
Greek	1	3,676	1	3,676	2	7,352
Japanese	593	720,736	594	721,853	1,187	1,442,589
Netherlands	1	4,754	1	4,754	2	9,508
Norwegian	23	73,886	23	73,886	46	147,772
Swedish	11	39,742	11	39,742	22	79,484
Total	1,870	2,591,759	1,822	2,572,706	3,692	5,164,465

CHINWANGTAO

(Resident Q.O.: TANG TSUNG-NIEN 鄧松年)

Quarantine inspection of vessels

During the year no quarantine restrictions against any coastal or foreign ports were declared, hence it has been our routine, as in previous years, to examine only those vessels arriving from foreign ports (mostly Japanese ports, except Dairen) direct. 154 vessels with a total gross tonnage of 495,408 were boarded. Vessels flying the Chinese flag top the list with 54 (144,324 gr. tons), followed by British 43 (159,246), Japanese 31 (100,372), Norwegian 16 (54,381), Denmark 4 (18,480), French 4 (15,436) and Swedish 2 (12,169). The total number of persons examined amounted to 7,054, composed of 5,222 Chinese and 1,832 foreigners; there was only one passenger. No quarantinable diseases were discovered on board.

TABLE I

Vessels inspected

<i>Nationality</i>	<i>No. vessels</i>	<i>Gross tonnage</i>
Chinese	54	144,324
British	43	159,246
Japanese	31	100,372
Norwegian	16	54,381
Denmark	4	18,480
French	4	15,436
Swedish	2	12,169
	154	495,408

The total registered tonnage of vessels that entered the port during the year was 1,274,380 as compared with 1,339,696 in 1935; the total registered tonnage of vessels that cleared the port during the year was 1,272,394 as compared with 1,341,208 in 1935. The largest vessel entering the port was the s.s. "Empress of Britain" of 22,545 net registered tons (42,348 gross tons), 733.5 feet in length and 97.8 feet in breadth. She anchored 5 miles outside the breakwater.

Bills of health

Twenty-eight bills of health were issued by this office to vessels of various nationalities during the year (Table II).

秦皇島新建之檢疫醫院

Fig. 36. New Quarantine Hospital at Chinwangtao.



新醫院內實驗室之一隅

Fig. 37. A corner of the laboratory, Chinwangtao Quarantine Hospital.

醫官辦公室

Fig. 38. Medical Officer's consulting room.



頭等病房之一隅

Fig. 39. Corner of a first-class ward.

TABLE II

Bills of Health

<i>Nationality</i>	<i>Number</i>
Swedish	9
British	7, including 1 man-of-war
German	6
U.S.A.	3 (1 army and 2 navy transports)
Norwegian	1
French	1
Danish	1

Table III shows the number of vessels with their respective destinations, for which our bills of health were granted.

TABLE III

Coffin certificates

A total of 7 coffin certificates were issued; of this number 2 were granted for exportation to Shanghai, 4 for transportation to other provinces of Hopei, and 1 for exportation to Shantung.

Rat-flea Survey

As in previous years, only one species of rats, *R. norvegicus*, was caught. Out of the total number of 600 rats trapped, there were 259 or 43.17 per cent males and 341 or 56.83 per cent females. An average of 5.08 rats per 100 traps set was recorded during a period

of 11,851 trap days when an average of 37.98 traps were set daily for 309 working days (max. Dec., 45 traps per day; min. Sept., Oct., Nov., 30 traps per day), the highest percentage of rats caught to traps set being 7.35 in December.

A total of 949 fleas were recovered, of which 730 (76.92 per cent) were *Xenopsylla cheopis* and 219 (23.08 per cent) *Ceratophyllus anisus*. The general flea index was 1.66 (average per month for the year) and *cheopis* index 1.27 (max. April, May, Oct., Nov. up to 3.28).

January 1936 was the coldest month in Chinwangtao for 30 years: mean temperature 15°F., minimum—7°F. The total amount of rainfall during the year (Feb.—Nov.) was 23.80 inches as compared with 25.87 inches for 1935.

Communicable diseases

No epidemic of any infectious diseases occurred in Chinwangtao during the year. The following cases were recorded: dysentery 10; scarlet fever 2; diphtheria 2; typhoid fever 2; relapsing fever 15; chicken-pox 8.

Fumigation

No fumigation of vessels was performed in the port during the year, as practically all vessels were coal boats and carried unexpired certificates issued by our Shanghai and Canton Stations and by recognized health authorities of Japanese ports.

Miscellaneous

No census was conducted in Chinwangtao, but according to the latest report issued by the local police authorities, there are 8,699 families. Estimating five persons in one family, the population works out at about 43,500. In many houses, however, which lodge coal labourers, there are as many as 10 or 20 people living in one house.

In view of the occurrence of many cases of relapsing fever among the coal workers annually, the Kailan Mining Administration is building a delousing plant large enough to disinfest 800 suits of clothing at one time. Besides this, the company has recently constructed a new building to house the outpatient department of the hospital, close by the workmen's quarters.

Our relations with ships' officers and agents, Customs members and local authorities have been cordial. To conclude, I wish to express my thanks to the Staff of the K.M.A., especially their D. M. O., our Honorary Medical Adviser Dr. Andrew Wang and his colleagues and the Staff of their Shipping Department, for their cooperation and assistance, and to the Customs authorities for their help whenever needed.

TABLE IV

Outpatients at Chinwangtao Quarantine Hospital, 1936

Erysipelas	2	Food poisoning	1
Diphtheria	2	Diabetes mellitus	1
Pneumonia	2	Digestive system	51
Influenza	7	Respiratory system	60
Whooping cough	4	Kidneys	2
Tuberculosis	4	Blood forming organs	1
Dysentery	7	Circulatory system	4
Malaria	1	Nervous system	15
Relapsing fever	6	Locomotor system	2
Ascariasis	2	Eye	17
Chicken pox	5	Skin	19
Measles	1	E.N.T.	20
Acute tonsillitis	12	Women's diseases	11
Catarrhal fever	12	Surgical cases	162
Hydrophobia	1	Vaccinations	84
Opium habit	4		
			522

TIENTSIN

(Resident Q.O.: S. Y. CHU 朱世英)

There was no serious epidemic of quarantinable disease during the year, although smallpox cases numbering 210 (mainly between April-July) were reported. Enteric fever claimed 387 patients, the incidence being highest in March, April and October. Dysentery patients numbered 157, scarlet fever 96, diphtheria 81, typhus fever 56 and cerebro-spinal meningitis 29.

Large consignments of old newspaper, rags, cotton and wool waste were imported during the year. The figures are:—

7,561 bales old cotton waste;
7,788 bales old gunny bags;
1,645 bales old newspaper;
531 bales old wool waste.

These were covered by 825 disinfection certificates issued at the ports of origin.

This office issued 26 outward bills of health in 1926. One vessel, s.s. "Hsin Feng" was inspected on arrival from Shanghai, a steerage passenger having died (of heart disease) during the voyage.

WUHAN QUARANTINE STATION

ANNUAL REPORT FOR 1936

By TAI FAN-YUAN (戴芳淵)
Quarantine Officer-in-charge

Apart from routine activities two events marked the work of this Station during 1936, namely, the establishment of a quarantine hospital in Wuhan and the extension of fumigation work to up-river ports.

After nearly five years' up-hill work, with the Station thrown practically upon its own resources, we have at last succeeded in equipping a quarantine hospital which, though inadequate and imperfect in many respects, yet serves a useful purpose. Through the generosity of the Inspector General of Customs (Sir Frederick Maze) and the local Commissioner of Customs (Mr. W. R. Myers), and the assistance of the Director, Dr. Wu Lien-teh, an empty building belonging to the Customs at Hanyang was leased at the nominal figure of \$1.00 per annum for five years beginning July 12, 1936. The new hospital, thoroughly renovated, consists of a two-storeyed brick structure with a large front garden, situated along the Bund at Hanyang at the foot of Turtle Mountain. Four large rooms on the ground floor are fitted up as medical officer's examination room, laboratory and pharmacy, male ward, and female ward. Other rooms are turned into quarters for the officers. There is accommodation for ten beds, and an outpatient clinic was opened on August 15. A resident doctor and nurse are in charge. The disadvantage of the hospital lies in its situation which is a long distance from the quarantine anchorage; hence incoming steamers are invisible from the building. The ideal site for a quarantine station would be on the Hankow Bund at Tan-sui-chi.

Fumigation work at Chungking was initiated in May and after an interval was renewed in November. Altogether 72 vessels were fumigated at that port with sulphur gas. Both the local Customs and shipping agents (especially the Ming Sung Industrial Company) cooperated with this Station to render the work successful.

As a result of the unusually low level of the middle Yangtze River towards the end of the year (a striking contrast to the spate of waters leading to the disastrous floods of 1931), ordinary naviga-



武漢檢疫所在漢陽新建之武漢檢疫醫院

Fig. 40. New Quarantine Hospital of the Wuhan Quarantine Station at Hanyang.



民國二十五年武漢檢疫
所職員全體攝影

Fig. 41. Staff of the Wuhan Quarantine Station, 1936.

武漢檢疫醫院診
查室之一隅

Fig. 42. Corner of the examination room in the new hospital of the Wuhan Station.





tion by most river steamers became impossible. Launches, tugs, motor boats and lighters were therefore used for transhipment of cargo and passengers to points higher up. This activity threw an additional burden upon our fumigation staff, as these small craft had to be fumigated as required by the quarantine regulations.

QUARANTINE ACTIVITIES

These include: collection of communicable disease statistics, fumigation and disinfection of cargoes and vessels, medical inspection of vessels, rat-flea survey, vaccination and inoculation, issuance of bills of health and certificates for transportation of coffins with corpse, medical services, etc.

Collection of communicable disease statistics

Data regarding communicable diseases in Wuhan were collected through the same channels as in former years, viz. by sending postcards to the hospital in Wuhan and requesting them to report to this Station every Saturday. Not a single case of cholera occurred in Wuhan in 1936, although typhoid and dysentery cases were numerous. There were only 14 cases of smallpox as against 112 in 1935. Cerebro-spinal meningitis occurred sporadically with 107 cases, being fewer than the previous year. Diphtheria was prevalent with 84 patients (Table I).

Fumigation and disinfection

Besides fumigation in Hankow, this Station has succeeded in extending the work to Chungking. A total of 72 vessels was fumigated there. In Hankow 480 vessels were treated with sulphur dioxide gas, making a grand total of 552 vessels, (121,763 tons). 18 vessels (7,076 tons) were granted deratization exemption certificates after satisfactory rat infestation inspections. 319 dead rats were recovered after fumigation. No signs of plague were found on examination. The record of five years' fumigation work may be tabulated as follows:

Year	Vessels	Tons	Dead rats
1932	208	51,942	67
1933	338	99,192	209
1934	341	96,893	222
1935	348	116,608	412
1936	570*	128,839	319

* Including those exempted.

Two vessels were disinfected during the year. They were s.s. "Paowo" of Jardines and C.L. "Yinhung." The disinfection of s.s. "Paowo" was carried out in January due to one death of suspected consumption on board. The "Yinhung's" case is as follows:

We were informed by the River Inspector of Customs on April 9 that 2 members of the crew of C/L "Yinhung" were suffering from cerebro-spinal meningitis and were requested to take immediate action to prevent its spread

ashore. The living quarters of the sick men (who were sent to hospital) were disinfected. Throat swabs of 18 contacts among the crew were taken and sent to the Catholic Hospital laboratory. All the crew were vaccinated against meningitis on the 13th, as the laboratory found 7 of the 18 specimens sent strongly positive. These 7 men were suspected to be the carriers and were ordered under surveillance. The vessel was ordered into quarantine on the other side of the river till the 20th when the second examination of throat swabs showed negative results. A second thorough disinfection of every compartment of the vessel was performed before she was released. Since meningitis is not a quarantinable disease as prescribed in the Chinese Quarantine Regulations, all these measures were taken at the request of the River Inspector's Office of the Customs.

Disinfection of old gunny bags etc.—As from December 25, 1935, viz. 3 months after our notification, old gunny bags and such like materials imported from abroad have to be accompanied by valid certificates of disinfection issued from the port of origin, otherwise disinfection was done by this Station. A total of 137 packages, consisting of 5,480 old gunny bags, imported were disinfected with formalin during the year under review.

Medical inspection of vessels

Twenty-five vessels with a total tonnage of 145,979 were boarded during the year. Among these, 12 were British, 9 Norwegian, 2 Japanese, 1 Chinese and 1 Greek. The personnel inspected consisted of 1,139 crew (461 Chinese, 678 foreigners) and 195 passengers (182 Chinese, 13 foreigners). Four of the vessels had deaths on board. No quarantinable diseases were found.

Rat-flea survey

The rat-flea survey, which had continued since January 1933, was suspended in June 1936. A total of 3,742 rats have been trapped and 11,373 fleas recovered during the past three and half years.

Year	No. rats trapped	No. fleas	Cheopis Index
1933	1,504	4,864	1.81
1934	1,125	3,147	1.50
1935	871	2,601	1.40
1936 (Jan.-June)	242	761	0.16
<hr/> Total	<hr/> 3,742	<hr/> 11,373	

Of the 242 rats trapped during the 6 months, 174 were from Hankow, 61 from Hanyang and 7 from Wuchang.

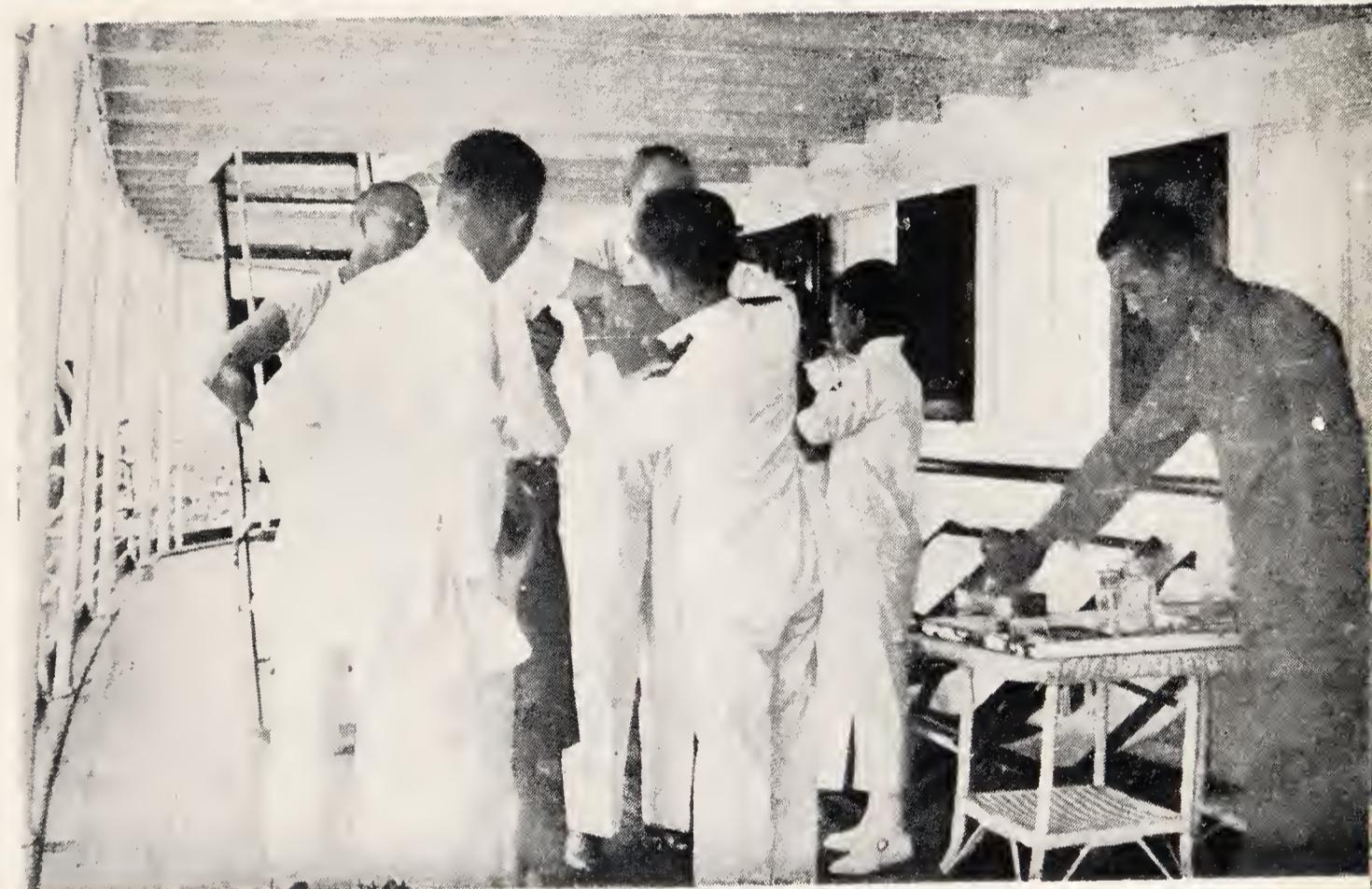
5,702 traps were set, spread over 151 working days. The average number of traps set per day was 37.81 (max. in June, 39.4; min. in March, 34.6). The number of rats trapped per 100 traps was 4.24.

159 (65.7 per cent) were *R.r. rattus*; 73 (30.2 p.c.) were *R. norvegicus* and 10 (4.1 p.c.) were *Gonomys sp.* Of the 761 fleas collected, 39 (5.2 p.c.) were *X. cheopis*; 475 (62.4 p.c.) *L. musculi* and 247 (32.4 p.c.) were *C. anisus*. *Cheopis* index did not exceed 1.0



漢口檢驗船員之情形

Fig. 43. Inspecting a vessel at Hankow. Picture shows the crew mustered for examination by the quarantine officer.



漢口檢疫人員在
江船上施行抗霍
亂接種

Fig. 44. Inoculating against cholera on board a river steamer at Hankow.



蒸薰江船後所獲之死鼠

Fig. 45. Dead rats recovered after fumigation on a river boat at Hankow.



during the six months. The average *cheopis* index for the period was 0.16.

Vaccination and inoculation

Vaccination and inoculation of crew and passengers were carried out on board vessels as usual. 1,051 persons were vaccinated in 1936, of whom 78 were passengers, 92 crew and 881 others done in the office. Anti-cholera inoculations numbered 2,454; 326 were done in the office, and 2,128 were given to the crews of river steamers.

Bills of health

Only 6 bills of health were issued to steamers clearing for Europe during the year. All of them were British. Inspection of the personnel on board was done in each case before the bill of health was granted.

Coffin transportation

A total of 127 coffin permits were issued during the year as compared to 10 for 1933, 4 for 1934 and 51 for 1935.

Medical services

The work done by the outpatient clinic of our hospital can be shown as follows:

(Aug.-Dec. 1936)	Surgical cases	50	Indigestion	3
	Diseases of the ear	2	Enteric F.	2
	" " " " eye	4	Bronchitis	9
	" " " " nose	1	Pulmonary T. B.	5
	" " " " skin	8	Rheumatism	4
	Venereal diseases	8	Catarrhal F.	1
			Cirrhosis of Liver	2
			Broncho-pneumonia	2
			Neurasthenia	1
			Dysentery	4
			Malarial F.	4
				—
		73		37
				—

Total no. of patients seen: 265 of whom 110 were new.

HEALTH OF HANKOW

There was no noticeable improvement in health conditions during 1936.

Population, births and deaths as reported by the Public Safety Bureau were as follows:

Month	No. families	No. persons	No. births	No. deaths
January	153,304	781,106	1,119	671
February	151,611	770,958	1,499	716
March	150,398	762,307	1,402	781
April	149,279	752,452	957	716
May	148,286	744,375	825	844
June	147,520	737,189	946	841
July	147,094	733,700	686	632
August	146,403	728,835	819	728
September	145,904	727,174	1,727	805

Commercial enterprises registered were:

	<i>old</i>	<i>new</i>	<i>Total</i>
Fresh food shops and restaurants	425	343	768
Salted food shops	11	7	18
Barbers	69	62	131
Bath houses	17	5	22
Fresh milk dealers	24	1	25
Vegetable markets	3	14	17
	—	—	—
	549	432	983
	—	—	—

Registration of medical practitioners, etc.:

	<i>old</i>	<i>new</i>	<i>Total</i>
Physicians (foreign trained)	263	20	283
Pharmacists	10	8	18
Chinese doctors (old style)	1,534	17	1,551
Midwives	96	3	99
Dentists	104	0	104
Veterinarians	1	1	2
Hospitals	17	0	17
Private clinics	16	48	64

Persons vaccinated numbered 111,436 and those inoculated against cholera 83,221.

HEALTH OF CHUNGKING

Health work in Chungking is done by a division of the Bureau of Public Safety. Their activities may be outlined as follows: Searching and buying of dead rats, vaccination and inoculation, registration of commercial enterprises, street cleaning, registration of medical practitioners and hospitals.

The statistics for 1936 are:

Dead rats collected (Jan.-Nov.)	340,385
(these were collected in the streets only)	
No. of deaths reported (Jan.-Nov.)	5,767
(no registration of births)	
Total vaccinations	21,619
Total inoculations	25,780
Registration of commercial enterprises:	
Hotels and restaurants	406
Tea houses and food shops	1,143
Barber shops	168
Bath houses	67
Public amusement places	16

There are 239 street cleaners and 12 rat collectors.

Medical practitioners and hospitals registered:

Hospitals (only four of these are well equipped, namely

privates (only four of these are well equipped, namely Syracuse-in-China, Catholic M.H., Canadian and Chung-king Public Hospitals).

TABLE I

Notifiable Diseases in Hankow, 1936

Diseases	Cases		Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
	Deaths	Cases														
Smallpox	4	1	2	1	1									5	14	1
Typhus					1											5
C. S. M.	2	13	15	37	15	5	6	1					5	2	6	107
	2	1	1	1	1	2	2						1	1	1	9
Enteric F.	16	23	32	30	38	55	53	62	53	48	20	20	20	20	450	
	3	1	1	1	1	1	1	2	1	1	2	2	2	2	2	16
Dysentery	12	24	22	19	55	59	91	159	127	93	27	29				717
		4		1	2			3	2	1	2	2				17
Diphtheria	4	4	3	11	2	8	2	3	2	14	22	9				84
				2		1				1	2					6
Scarlet F.		2										1				3
Total	34	68	75	100	111	132	152	225	182	161	71	69				1,380
	3	8	1	5	4	2	3	5	3	3	7	5				49

TABLE II

Number, Tonnage and nationalities of vessels fumigated, 1936

Vessels Tonnage	Chinese	British	Japanese	American	Italian	Norwegian	Total
January	6 3,262	10 1,215	4 549	1 3	—	—	21 5,029
February	13 1,408	15 1,871	4 187	—	—	—	32 3,466
March	8 3,042	11 1,380	6 816	2 280	—	—	27 5,518
April	16 1,941	10 5,297	2 49	1 406	—	—	29 7,693
May	30 6,339	14 3,517	5 471	— —	1 550	—	50 10,877
June	40 9,053	11 11,539	3 1,225	2 524	—	—	56 22,341
July	17 7,378	8 2,362	4 455	— —	— —	1 2,465	30 12,660
August	11 4,351	17 2,428	7 543	1 11	— —	— —	36 7,333
September	26 3,840	21 3,519	8 3,125	1 140	— —	— —	56 10,624
October	47 5,419	18 4,007	5 1,030	2 546	— —	— —	72 11,002
November	35 5,683	11 2,291	6 758	— —	— —	— —	52 8,732
December	67 10,095	16 4,901	8 1,492	— —	— —	— —	91 16,488
Total	316 61,811	162 44,327	62 10,700	10 1,910	1 550	1 2,465	552 121,763

Deratization exemption certificates

March	— —	1 199	— —	1 3	— —	— —	2 202
May	3 662	— —	— —	— —	— —	— —	3 662
June	6 257	— —	1 1,026	— —	— —	1 4,729	8 6,012
October	— —	1 19	— —	— —	— —	— —	1 19
December	4 181	— —	— —	— —	— —	— —	4 181
Total	13 1,100	2 218	1 1,026	1 3	— —	1 4,729	18 7,076

TABLE III

Types of vessels fumigated

	Steamer	Motor Vessels	Launch	Tug	Lighter	Pass. boat	Motor boat	Hulk	Total
January	3	—	—	5	13	—	—	—	21
February	—	—	7	9	15	1	—	—	32
March	2	4	1	7	13	—	—	—	27
April	3	1	—	14	10	1	—	—	29
May	5	10	6	10	17	1	—	1	50
June	13	11	4	10	16	2	—	—	56
July	6	—	2	11	11	—	—	—	30
August	3	1	6	9	16	1	—	—	36
September	5	2	2	21	25	1	—	—	56
October	5	3	3	19	41	1	—	—	72
November	4	13	2	12	21	—	—	—	52
December	9	21	3	11	42	4	1	—	91
Total	58	66	36	138	240	12	1	1	552

TABLE IV

Dead rats recovered after fumigation

	R.r. <i>rattus</i>		R.r. <i>alex.</i>		R.r. <i>frug.</i>		R. <i>norveg.</i>		<i>Gunomys</i>		<i>Mus sp.</i>		Others	Total	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
January	—	1	—	—	—	—	—	—	—	—	—	—	—	1	
March	—	3	—	—	—	—	2	4	—	—	—	—	—	9	
May	4	11	—	—	—	—	1	—	—	—	—	—	—	16	
June	10	18	—	3	—	—	1	3	—	—	—	—	5	40	
July	15	22	—	—	—	—	7	8	—	—	—	—	—	52	
August	2	6	—	—	—	—	1	4	—	1	—	—	—	14	
September	18	5	—	—	—	—	2	1	2	—	—	—	—	28	
October	11	9	—	—	—	—	4	4	3	1	4	4	—	40	
November	5	7	—	—	—	—	3	3	—	—	—	—	—	18	
December	30	18	—	—	9	9	4	5	1	1	—	19	5	101	
Total	95	100	—	3	9	9	25	32	6	3	4	4	19	10	319

TABLE V

Vessels inspected at Hankow, 1936

Flag	No. vessels	Gr. Tons	No. passengers		No. crew	
			Foreign	Chinese	Foreign	Chinese
British	12	67,862	- 12	182	299	350
Norwegian	9	66,500	1	—	280	37
Japanese	2	4,349	—	—	70	—
Chinese	1	1,631	—	—	—	74
Greek	1	5,637	—	—	29	—
Total	25	145,979	13	182	678	461

TABLE VI

Summary of vessels and tonnage entering Hankow, 1936

Class	No. of vessels	Tonnage
Ocean and Coast Steamers	179	358,507
River Steamers	2,264	2,994,179
Launches, Lighters, etc.	4,963	500,583
Total	7,406	3,853,269

Summary of vessels and tonnage clearing Hankow, 1936

Class	No. of vessels	Tonnage
Ocean and Coast Steamers	180	361,507
River Steamers	2,263	2,992,679
Launches, Lighters, etc.	4,933	497,533
Total	7,376	3,851,719

CONCLUSION

We are grateful to the local Customs authorities, the City Government, public and private hospitals and the shipping companies and agents for their co-operation and assistance rendered to this Station in 1936.

CANTON QUARANTINE STATION

ANNUAL REPORT FOR 1936

By T. C. CHUNG (鍾子晉)

Quarantine Officer-in-charge

Before the 15th year of the Republic (1926), the administration of the Canton Quarantine Service was in the hands of a foreign doctor jointly appointed by the Canton Maritime Customs and the Consular Body in Canton. Fees were levied on each inward vessel inspected. In the absence of an independent organization, its administration had not been quite satisfactory as inward vessels were in some cases delayed for several hours before they were inspected. These delays gave rise to much criticism from shipping circles, especially during the 15th year of the Republic (1926) when the Hongkong-Canton big strike was on and more than 30 vessels came into the harbour daily. These vessels had to anchor in the harbour till the next day before they were inspected, and it was for this reason that the shipping merchants petitioned the Government to put the administration of the Quarantine Service under Government control. Accepting the merchants' petition, the late Dr. C. C. Wu, then Mayor of Canton, proposed to the Government that the Service be taken over. Accordingly, in September 1926, Dr. T. C. Chung was instructed by Mr. Sun Fo, then Chairman of the Canton Municipal Council, to draw up Quarantine regulations suited to local conditions, for the approval of the Municipal Council. These regulations were adopted and promulgated with the establishment of the Canton Quarantine Service Station. The new station was then under the control of the Municipal Bureau of Public Health with Dr. Szetoo Chiu as director, and Drs. T. C. Chung, Wong Yan-wing, Wu Ping-chuck and Hung Tso as quarantine officers. The Canton Customs and Consular Body strongly protested against the establishment of the new station, and foreign vessels which came into the harbour refused to permit medical inspection. The foreign doctor who was quarantine officer in the old regime, refused to relinquish his position and continued to carry on his work as quarantine officer, with the result that disputes became the order of the day. The Chinese authorities at first experienced great difficulty in getting foreign vessels to comply with their regulations.

Fortunately, the people and public bodies backed up the new station and gave their whole-hearted support to the Chinese quarantine officers, who finally obtained from the foreign doctor, on the settlement of their dispute at the Bureau of Public Health, a written statement that he "would no longer oppose and interfere" with the activities of the new station. Offending vessels were fined. Later, the Customs authorities accepted the validity of "pratique" issued by the Chinese quarantine authorities, and the work at Canton was at last put on a firm basis.

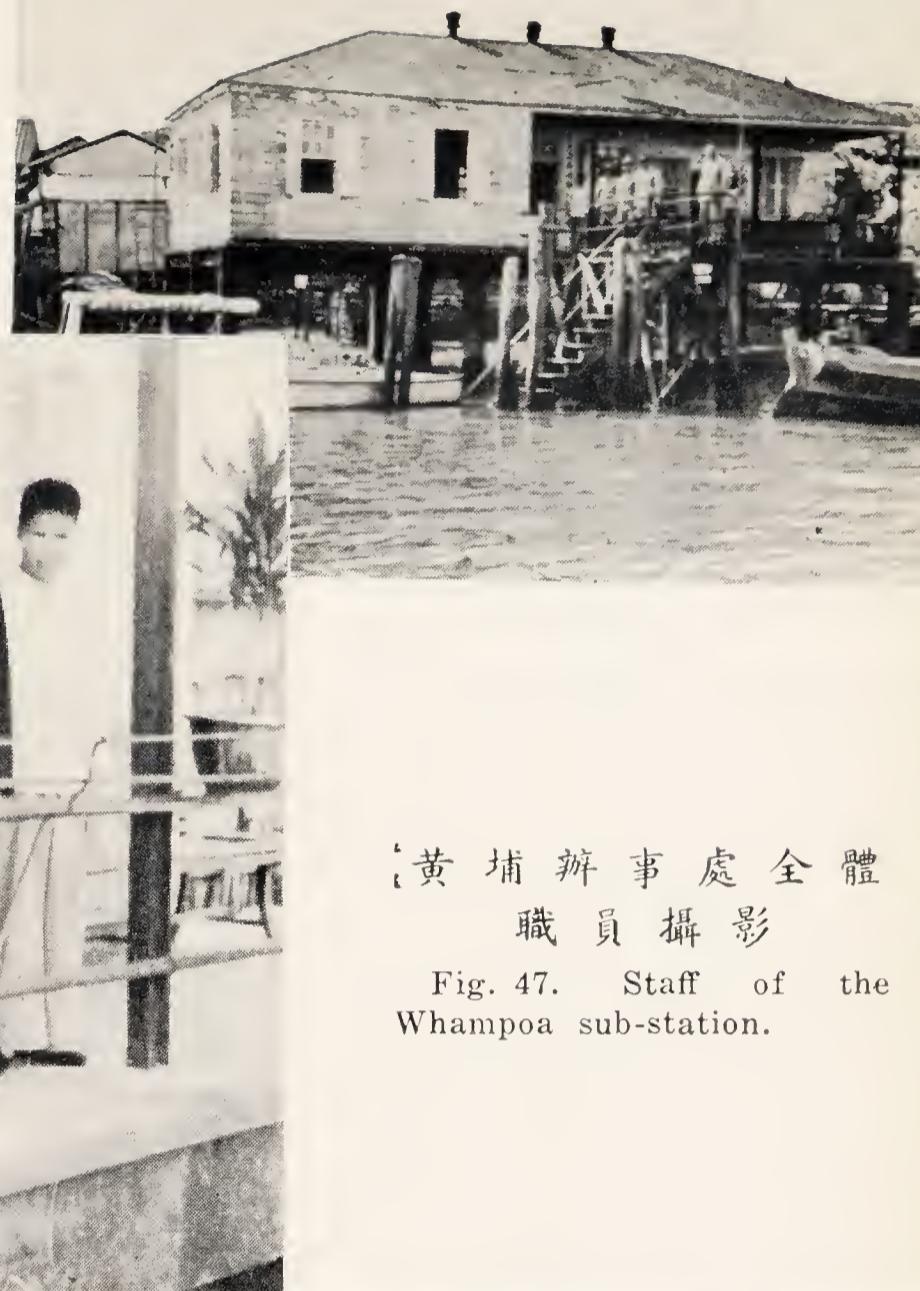
There are two navigable routes by which Canton harbour is accessible; one is by passing Ngau-shan (牛山), Sun-tso (新造) and Nam-shek-tau (南石頭) to Pak-ngor-tam (白鵝潭), and the other is by passing Whampoa (黃浦) and Sun-chau (新洲) to Tai-sha-tau (大沙頭). Two stations have therefore been established, one at Nam-shek-tau and the other at Whampoa for the inspection of inward vessels. These stations were first housed in sampans, three motor boats being used to convey the quarantine officers to ships. In the 18th year of the Republic (1929) buildings were erected in Nam-shek-tau and Whampoa. The Whampoa office is still of wooden construction, but it is hoped that as soon as funds are available a concrete building will be erected to house among other units isolation wards, fumigation chamber, examination rooms.

Close cooperation with similar bodies of other countries has been maintained by the Canton Quarantine Service since it came into being in 1926. In August 1927 we entered into an agreement with the Eastern Bureau of the League of Nations' Health Organization at Singapore for transmission of weekly reports of quarantinable diseases by telegraphic advices. Since then, the work of this station has been rendered much more convenient and efficient. It must be noted that the Canton Quarantine Service is the first of its kind in China and, during its ten years' existence, has given a good impression to the general public and won international confidence, though there has been no remarkable achievement.

The reorganization of the local station was announced on September 4, 1936. Thenceforth it is to be known as the Canton Station of the National Quarantine Service directly under the administration of the Wei Sheng Shu (National Health Administration) of the Central Government, and its activities will therefore be conducted in accordance with the regulations of that body.

廣州海港檢疫所黃浦辦事處之外觀

Fig. 46. Whampoa sub-station of the Canton Quarantine Station. Vessels discharging cargo at Whampoa or bound for Canton harbour up the river have to stop here for inspection.



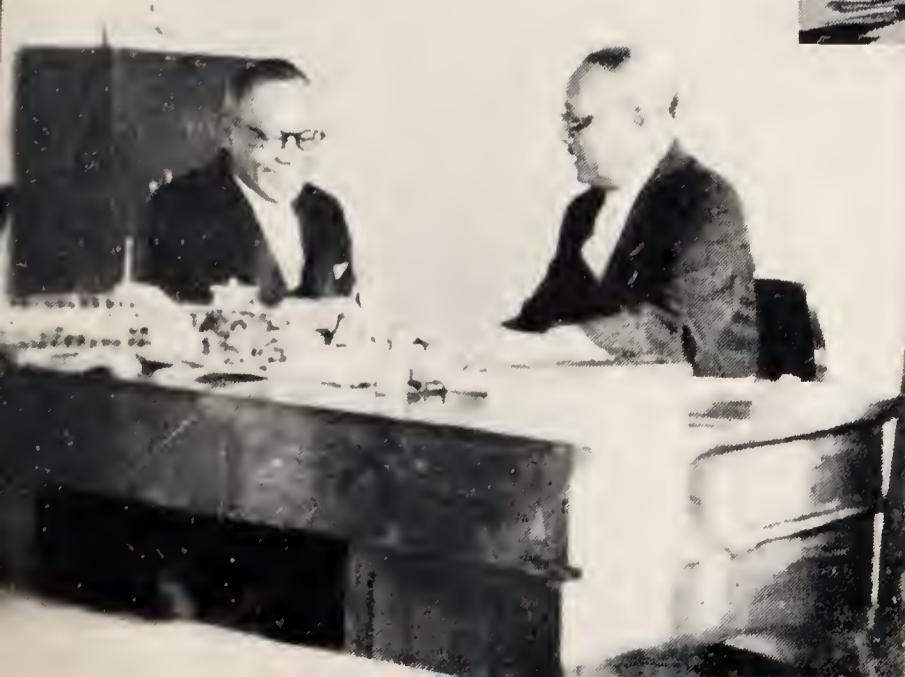
黃浦辦事處全體職員攝影

Fig. 47. Staff of the Whampoa sub-station.



珠江中檢疫汽船之一

Fig. 48. One of the motor boats in use on the Pearl River for medical inspection work.



廣州海港檢疫所之所長辦公室

Fig. 49. Office of the Canton Quarantine Station. Dr. Wu Lien-teh (left) and Dr. T. C. Chung, Q. O. in charge.



MEDICAL INSPECTION OF VESSELS

Prior to September 1936, all inward vessels were required to anchor before Shu-ching Fort (綏靖炮台), Nam-shek-tau, or Chatsha Water Gate (七沙水閘), Whampoa, at the Quarantine Anchorage, to await inspection. Shipping companies were requested to notify this station the expected dates of arrival of their vessels, so that the necessary preparations could be made. No unnecessary delay arose, and both travelling public and shipping circles had no reason to complain. All inward vessels, passengers and ships' crews were, irrespective of nationality, subject to inspection. Any births, deaths and cases of infectious diseases were handled in accordance with the Quarantine Service regulations.

Following the reorganization of September 1936, some alteration in the old procedure has been made to conform to the regulations of the National Quarantine Service and to afford more convenience to shipping merchants by allowing vessels to come alongside their respective wharves before the inspection starts. Those vessels that arrive from infected ports are still required to anchor at the Quarantine Anchorage awaiting inspection, in accordance with Article 14, and its supplements as approved by the Wei Sheng Shu and promulgated by this station on December 7, 1936, in Notifications 2 and 3:—

NATIONAL QUARANTINE SERVICE

Notification No. 2

PORT OF CANTON

Notice is hereby given that acting on instructions from the Director of the National Quarantine Service, all vessels arriving from coastal ports (including Hongkong) as from midnight on September 6, 1936, except when such ports have been declared "infected," are permitted to proceed direct into port without waiting at the Quarantine Anchorage. Quarantine inspection will be done on the arrival of the vessel at its berth.

PORT OF WHAMPOA

Notice is also given that vessels arriving at Whampoa for the purpose of discharging cargo and/or passengers must abide by the National Quarantine Regulations (1930).

T. C. CHUNG,

Quarantine Officer-in-Charge.

Canton, September 4, 1936.

WEISHENGSHU NATIONAL QUARANTINE SERVICE
PORT OF CANTON
Notification No. 3

The following notification is supplementary to Notification No. 2 issued on September 4, 1936.

Vessels arriving at Canton from foreign ports (even if they have called at Hongkong en route) are subject to quarantine inspection either at Whampoa or Nam Shek Tao, in accordance with Article 14 of the Quarantine Regulations of the National Government, 1930, except where their port of call before Canton is a Chinese port. The quarantine signal must be displayed and no communication with the shore is permitted until free pratique is granted by the Quarantine Officer.

Vessels arriving from coastal ports (including those calling at Hongkong en route) are exempt from quarantine inspection and permitted to proceed to their berths, except when (a) there has been an outbreak of infectious disease on board during the voyage; (b) a death has occurred on board during the voyage; (c) any of the ports of call has been proclaimed infected. Under these circumstances they must await inspection at the Quarantine Anchorage.

The National Quarantine Service, however, reserves the right to order any vessel into quarantine for reasons which it considers good and sufficient.

The above regulations will come into force as from December 7, 1936.

By order of the Director,

T. C. CHUNG,
Quarantine Officer-in-Charge,
Canton.

Canton, December 1, 1936.

During 1936, 1,152 vessels were medically inspected, of which 343 vessels were of Chinese nationality, 602 were British, 71 Japanese, 3 Portuguese, 100 Norwegian, 14 French, 9 Dutch, and 3 Danish. The total gross tonnage amounted to 2,808,094 and net tonnage 1,818,088. Passengers numbered 69,049 persons, and ships' crew 99,795 (Tables I and II).

FUMIGATION

All inward vessels are required to be fumigated once every six months. The fumigation process which lasts six hours is personally supervised by the quarantine officer. All dead rats are classified and examined for plague. Prior to September 4, 1936, fumigation of vessels was directly controlled by the Director of the Municipal Bureau of Public Health. Since the reorganization in September (till the end of December 1936), 30 vessels with a total registered tonnage of 43,539.50 tons were fumigated and 190 rats were killed (Table III).

TABLE I

Vessels inspected in 1936 (Sept. to Dec.)

Month	Nation.	No.	Gr. Ton.	Passengers		Crew	
				For.	Ch.	For.	Ch.
Sept.	Chinese	20	49,800.09	8	1,659	31	1,818
	British	47	122,100	44	3,083	321	4,330
	Norweg.	14	36,164	11	338	90	670
	Japan.	6	14,356.66	9	161	75	448
Oct.	Chinese	19	55,203.91	16	2,086	28	1,994
	British	52	135,452.59	16	2,509	337	4,600
	Norweg.	11	27,743	0	624	71	626
	Japan.	6	14,459.05	9	245	73	412
	French	1	2,163	0	3	9	59
Nov.	Chinese	22	59,667.54	24	2,453	26	2,183
	British	52	135,617	20	1,646	350	4,607
	Norweg.	9	23,604	3	384	58	527
	Japan.	4	9,343.65	2	224	69	266
	Danish	1	1,973	0	3	7	57
Dec.	Chinese	22	63,217.51	14	2,184	33	2,057
	British	55	142,761.26	32	1,703	391	4,666
	Norweg.	15	37,649	1	614	91	958
	Japan.	5	13,095.79	2	223	86	340
	French	1	2,163	0	78	9	75
Total (Sept.-Dec.)		362	946,534.05	211	20,220	2,155	30,693

TABLE II

Vessels inspected at Quarantine Anchorage in 1936 (Dec.)

Month	Nation.	No.	Gr. Ton.	Net Ton.	Passengers		Crew	
					For.	Ch.	For.	Ch.
Dec.	British	3	7,905	4,690	1	54	22	328
	Norweg.	2	2,806	1,567	0	2	10	80
	Japan.	1	3,851.1	2,371.54	0	0	37	0
Total		6	14,568.1	8,628.54	1	56	69	408

TABLE III

Number of Vessels fumigated and rats recovered in 1936

Month	No. vessels	Net Ton.	Rats recovered				Total	
			<i>R. norvegicus</i>		<i>R. r. ratus</i>			
			M.	F.	M.	F.		
September	5	8,992	7	9	4	3	23	
October	9	11,499	11	14	4	7	36	
November	7	10,750.5	26	21	5	11	63	
December	9	12,298	25	24	11	8	68	
	—	—	—	—	—	—	—	
Total	30	43,539.5	69	68	24	29	190	

Nation.	No. vessels	Net Ton.
British	16	24,439
Chinese	8	10,470.5
Norweg.	5	7,965
Portug.	1	665

EXPORT OF COFFINS WITH CORPSE

Issuance of permit for the export of coffins with corpses was not handled by this station till last September; before this date by the Municipal Bureau of Public Health. Applications for permits must be accompanied by medical certificates stating cause of death. Only one permit was issued in December 1936, for Wang Yu-wung, a native of Chungshan district. The coffin was shipped to Macao by s.s. "Shing Cheung."

REORGANIZATION OF THE STATION

This included repairs to the Whampoa station which is of wooden construction and had been in a dilapidated condition. The walls and water pump of the Nam-shek-tau station, and the engine and hull of the No. 3 motor boat are also in course of repair.

Three motor boats have hitherto been in service, of which two (Nos. 2 and 3) have proved unsatisfactory. Running expenses are very high as they burn gasoline, and the speed is very low. The purchase of two new diesel launches is an immediate necessity.

if the work of the Station is to be carried out satisfactorily in the future.

The building and adequate equipment of a modern quarantine hospital is one of our objectives. The present block at Nam-shek-tau is at present incompletely equipped, but it is hoped that when funds and permission have been acquired, the property (measuring more than 8 mou) will be properly developed. As the largest port in South China, Canton deserves to have a thoroughly modern and well-equipped quarantine station.

SWATOW QUARANTINE STATION

REPORT FOR 1936 (SEPT.-DEC.)

By F. S. WONG (王拱辰)

Acting Quarantine Officer-in-charge

Acting under telegraphic instructions from the Director I proceeded to Swatow on September 11 to assist him in taking over the existing quarantine station and reorganizing it as a unit of the National Quarantine Service, in accordance with the mandate of the National Government.

On arrival we found things in rather a chaotic state; there were practically no funds and a depleted staff awaited us. To help us in getting things into some semblance of order, a junior Quarantine Officer and an accountant were seconded from Amoy. The lack of funds was a very great handicap as unfortunately there is as yet no Government appropriation for Swatow. We had to borrow \$5,000.00 from the Amoy Station pending settlement of the main issue, namely, the collection of vaccination fees on emigrants. As, at present, it is practically impossible to carry out the work of the Station without financial assistance it is hoped that an adequate appropriation will soon be forthcoming from the Government.

I received from the Weishengshu the appointment of acting Quarantine Officer-in-charge of Swatow in addition to my substantive post at Amoy.

Right from the very beginning I realized that the task before me was not going to be an easy one. In addition to the conditions mentioned above I found myself faced with strong opposition from such bodies as the overseas union. Unfortunately, the previous quarantine administration had not been such as to inspire confidence or invite the cooperation of these bodies, and the latter accordingly regarded the attempt to charge a vaccination fee as another form of extortion. The Quarantine Officers were unjustifiably accused of trying to enforce these charges for their own personal gain. These accusations were not only unfounded but very unfair to men who, as servants of the Government, were only faithfully carrying out their duty.

Despite the Director's assurances that such was not the case but that every cent charged was accountable to Government and that

the sole object was to build up an efficient Quarantine Service similar to that in other ports, we still could not get any cooperation.

In fairness to the shipping companies it must be mentioned that they all expressed their willingness to cooperate with us, but for obvious reasons could not go so far as to bring pressure to bear upon the brokers and unions.

On October 11, I re-visited Swatow but negotiations again broke down. I reported to the Director with whom I travelled to Nanking, where a detailed account of the situation was given to Dr. J. Heng Liu, Director General of the National Health Administration. The latter agreed to the suggested scale of vaccination fees and gave permission to enforce it. The opposition bodies gradually began to realize that we meant what we said, and some of the shipping brokers were won over. The overseas union, however, still remained adamant, telegraphed and petitioned the Central Government many times against our work, and it was only after protracted negotiations that they finally acquiesced. Payment of fees was accordingly enforced on November 20.

I would like to take the opportunity here of expressing our gratitude to all those who gave us their support during the long and tedious negotiations and thus in no small measure helped to promote a successful termination. The names of all these gentlemen are too numerous to mention, but in particular I would like to thank H.B.M. Consul, the Mayor and the Customs Commissioner, whose sympathetic attitude made it possible for the station to function in a normal way.

EMIGRATION

From the point of view of emigration Swatow is a very busy and important port. All emigrant ships leaving Amoy (except those belonging to the B.I. and Jardine lines) call at Swatow for more passengers. In addition there is an extensive emigrant traffic between Swatow and Bangkok, and Swatow and Saigon.

As regards emigration to Bangkok, we are at present in rather a difficult position. The authorities there are very particular about even slight cases of trachoma and all emigrants with any evidence of trachoma are repatriated. If we reject all these cases during the primary examination at the office there is the possibility of once more arousing the opposition of the local bodies, who will regard us as being unnecessarily strict. If we do not, our reputation for efficiency and thoroughness will suffer in Bangkok. Though a second and final examination is held on board before the departure of the

ship, the Quarantine Officer, because of occasional interference to his authority, cannot fully make use of his judgment or discretion for the best interests of the shipping companies.

An eye department has been instituted under an expert officer trained in the ophthalmic clinics of Germany, where all those rejected can be treated free of charge. As soon as they get cured or improved to a point where further success cannot be obtained they will be free to go. By this means, we hope to persuade the overseas union that we are doing all in our power to help the emigrants. The ideal thing, of course, is to put up a "Home" for the unfortunate emigrants, like the one we have in Amoy. It is our intention that such a Home should be provided for, but this cannot be accomplished without funds.

QUARANTINE

Unfortunately, owing to lack of funds, we do not yet possess our own motor boat or a quarantine hospital, so are not in a position to enforce fully the Quarantine Regulations for ships coming from foreign or proclaimed ports. However, a new motor boat is under construction and as soon as this is available, we shall be in a position to inspect incoming vessels.

Our most important need, both from a national as well as an international point of view, is undoubtedly an isolation hospital. It is rather perturbing when one thinks of this large city, having direct contact with so many foreign as well as coastal ports, without some place where cases of an infectious nature can be effectively isolated. Such an institution is an absolute necessity not only to help prevent the spread of any incipient epidemic which might break out in the city itself and eventually extend to other ports, but also in quarantine work.

The staff consists of three Quarantine Officers, one assistant, two vaccinators, and lay members.

Just before the end of the year it was decided to carry out a rat-flea survey of the whole city. A detailed report will be available for the next Series.

We realize that although much ground has been covered there is still a great deal to be done. Mention has been made of some of the difficulties which had to be faced, and no doubt others will crop up from time to time. However, we can assure all parties concerned that if we have their continued cooperation in the future all obstacles will be removed and the way paved for the establishment of a modern and efficient Quarantine Station.

TABLE I
Emigrants leaving Swatow, September 1936

Date	Name of Vessel	Passengers Cabin				Emigrants Deck				Total Cabin & Deck
		M.	W.	C.	Total	M.	W.	C.	Total	
SINGAPORE										
Sept. 2	Cremer	7	1	2	10	334	108	80	522	532
," 2	Hai Lee	—	—	—	—	12	14	—	26	26
," 9	Anhui	3	1	—	4	474	349	218	1,041	1,045
," 13	Hong Siang	—	—	—	—	187	60	14	261	261
," 15	Van Heutsz	2	1	—	3	305	190	110	605	608
," 23	Anshun	3	3	4	10	306	224	107	637	647
," 25	Hai Hing	—	—	—	—	111	146	56	313	313
," 29	Cremer	5	3	2	10	335	243	132	710	720
	Total	20	9	8	37	2,064	1,334	717	4,115	4,152
BANGKOK										
Sept. 2	Kweiyang	3	1	—	4	213	53	52	318	322
," 2	Helios	—	—	—	—	143	58	64	265	265
," 15	Kwangsu	4	5	3	12	211	109	89	409	421
," 15	Hiram	—	—	—	—	180	60	80	320	320
," 25	Hellas	—	—	—	—	160	58	52	270	270
," 25	Kalgan	5	2	—	7	230	78	50	358	365
	Total	12	8	3	23	1,137	416	387	1,940	1,963
SAIGON										
Sept. 24	Shun Chih	6	3	4	13	360	155	108	623	636

Total emigrants, September 1936: 6,751.

TABLE II

Emigrants leaving Swatow, October 1936

Date	Name of Vessel	Passengers Cabin				Emigrants Deck				Total Cabin & Deck
		M.	W.	C.	Total	M.	W.	C.	Total	
SINGAPORE										
Oct. 5	Hai Lee	—	—	—	—	26	16	10	52	52
„ 7	Anhui	7	5	4	16	800	409	251	1,460	1,476
„ 13	Van Heutsz	7	2	1	10	333	176	78	587	597
„ 14	Hong Peng	2	4	2	8	368	130	28	526	534
„ 21	Anshun	12	3	5	20	385	184	77	646	666
„ 26	Hai Hing	—	—	—	—	32	29	10	71	71
„ 27	Cremer	5	4	10	19	338	231	89	658	677
„ 29	Hong Kheng	1	3	—	4	232	172	60	464	468
Total		34	21	22	77	2,514	1,347	603	4,464	4,541
BANGKOK										
Oct. 2	Kweiyang	8	3	1	12	187	49	29	265	277
„ 2	Helios	—	—	—	—	168	69	57	294	294
„ 13	Hiram	—	—	—	—	192	56	50	298	298
„ 13	Kiangsu	4	—	—	4	254	65	40	359	363
„ 23	Kalgan	4	—	—	4	291	103	65	459	463
„ 23	Hellas	—	—	—	—	109	33	45	187	187
„ 30	Solviiken	4	2	1	7	186	48	58	292	299
„ 30	Helios	1	—	—	1	155	38	35	228	229
Total		21	5	2	28	1,542	461	379	2,382	2,410
SAIGON										
Oct. 22	Shun Chih	9	—	—	9	665	113	88	866	875

Total emigrants, October 1936: 7,826.

TABLE III

Emigrants leaving Swatow, November 1936

Date	Name of Vessel	Passengers Cabin				Emigrants Deck				Total Cabin & Deck
		M.	W.	C.	Total	M.	W.	C.	Total	
SINGAPORE										
Nov. 4	Anhui	7	6	11	24	693	312	142	1,147	1,171
„ 10	Van Heutsz	5	2	5	12	356	224	86	666	678
„ 12	Hong Siang	--	--	--	--	43	10	3	56	56
„ 14	Hai Lee	6	1	--	7	76	33	8	117	124
„ 18	Anshun	1	2	4	7	411	251	151	813	820
„ 24	Cremer	5	8	7	20	272	142	67	481	501
„ 25	Hai Hing	--	--	--	--	95	66	27	188	188
„ 26	Hong Peng	--	--	3	3	102	57	13	172	175
	Total	24	19	30	73	2,048	1,095	497	3,640	3,713
BANGKOK										
Nov. 10	Hiram	1	1	1	3	179	43	41	263	266
„ 11	Kweiyang	4	4	3	11	302	92	63	457	468
„ 20	Kalgan	6	5	2	13	268	78	52	398	411
„ 20	Hellas	--	--	--	--	132	32	33	197	197
„ 27	Kiangsu	7	2	1	10	127	38	41	206	216
„ 27	Helios	--	--	--	--	152	37	44	233	233
	Total	18	12	7	37	1,160	320	274	1,754	1,791
SAIGON										
Nov. 25	Chun Chih	6	5	2	13	612	163	112	887	900
„ 27	Lyeemoon	--	1	--	1	481	74	35	590	591
	Total	6	6	2	14	1,093	237	147	1,477	1,491

Total emigrants, November 1936: 6,995.

TABLE IV

Emigrants leaving Swatow, December 1936

Date	Name of Vessel	Passengers Cabin				Emigrants Deck				Total Cabin & Deck
		M.	W.	C.	Total	M.	W.	C.	Total	
SINGAPORE										
Dec. 2	Anhui	9	3	2	14	665	241	99	1,005	1,019
" 8	Van Heutsz	6	6	2	14	254	90	43	387	401
" 10	Hong Kheng	3	1	5	9	108	51	8	167	176
" 15	Hai Lee	—	—	—	—	36	21	2	59	59
" 16	Anshun	—	—	1	1	408	193	100	701	702
" 22	Cremer	3	—	—	3	167	62	29	258	261
" 22	Hong Siang	—	1	—	1	71	56	13	140	141
" 28	Hai Hing	—	1	—	1	78	37	13	128	129
" 28	Gustav Died- erishsen	—	—	—	—	26	147	48	221	221
" 30	Anhui	8	1	3	12	744	340	183	1,267	1,279
	Total	29	13	13	55	2,557	1,238	538	4,333	4,388
BANGKOK										
Dec. 8	Kweiyang	8	3	1	12	252	82	62	396	408
" 8	Hiram	—	—	—	—	204	60	75	339	339
" 18	Hellas	1	3	—	4	111	19	23	153	157
" 18	Kalgan	4	1	—	5	220	44	30	294	299
" 24	Helios	—	—	—	—	188	28	32	248	248
" 24	Kiangsu	8	1	2	11	165	21	16	202	213
	Total	21	8	3	32	1,140	254	238	1,632	1,664
SAIGON										
Dec. 16	Lyeemoon	5	4	6	15	526	81	54	661	676

Total emigrants, December 1936: 6,728

Grand Total for Sept.-Dec. 1936: 28,300

CENTRAL CHOLERA BUREAU IN 1936

- A. CONFERENCE ON CHOLERA CONTROL IN SHANGHAI.
- B. COMMITTEE ON EPIDEMIOLOGY.
- C. REPORT OF SUB-COMMITTEE ON METEOROLOGY.
- D. INOCULATION STATISTICS.
- E. BULLETINS.

A. CONFERENCE ON CHOLERA CONTROL IN SHANGHAI

Representatives of the three municipalities in Shanghai, National Health Administration, Nanking, National Quarantine Service, Railway Health Service, Chinese Red Cross Hospital and Lester Institute met on April 6, at 3 p.m. in the Administration Building of the Kiangwan Civic Centre, to discuss plans against a possible cholera epidemic in the coming summer. The following were present:—Drs. Wu Lien-teh (Chairman), C. P. Li, J. H. Jordan, T. A. Li, Y. Palud, R. C. Robertson, F. C. Yen, T. F. Huang, M. Y. Dzen, J. H. Blakelock, H. Smith, W. R. Johnston, K. Y. Sie, E. Landauer, H. Yu, R. Pollitzer, J. W. H. Chun, C. A. Sung and C. Y. Wu (Hon. Secretary).

Dr. Wu Lien-teh, in opening the meeting, referred to the unfortunate absence (due to an accident) of Dr. J. Heng Liu, Director General of the National Health Administration, who was to have presided that day. He welcomed the delegates present and thanked them for coming, some from long distances.

Reports of cholera prevention work in 1935

Dr. C. P. Li reported on behalf of the Central Field Health Station, Nanking. He mentioned that the Department of Bacteriology and Epidemic Disease Control carried out stool examinations throughout 1935 but found no true cholera cases. Classes for public health doctors, inspectors and nurses were also held, and expeditions sent to many places in the interior such as Kiangsi and South Fukien to undertake investigations into diseases such as malaria, typhoid, dysentery, plague, etc. Research work was also carried out on cholera vibrios and anti-cholera vaccine. The Central Epidemic Prevention Bureau was moved from Peiping to Nanking and was now housed in a new building. Biologicals were being produced.

The reports of the Epidemiological and Propaganda Committees were circulated and read respectively by Drs. J. W. H. Chun and T. A. Li. Dr. Pollitzer read the report of the sub-committee on water investigation. In this connection, the Chairman thanked the Lester Institute and Dr. Robertson for granting special facilities for carrying out the investigations at the laboratories of the Institute. Much had been accomplished although naturally the work was not yet complete. Dr. Robertson suggested that more bacteriophage work be carried out in Shanghai laboratories.

Various reports were tabled, including Dr. Dzen's report on stool examinations in Greater Shanghai, Dr. Li's report of anti-cholera inoculations (505,125 inoculations in Greater Shanghai for 1935) and Dr. Huang's reports on inoculations of railway employees and their families.

Dr. Jordan mentioned that about 600 wells in the Settlement were disinfected with chlorinated lime last year. Inoculations fell off on account of the greater reluctance of the public to come for this prophylactic measure. Anti-fly work was carried out. His department found that the bottle fly catchers sold to all food shops were popular with the shopkeepers as they were good advertisements, the customers actually being able to see flies trapped inside them. Measures against fly larvae were also pushed.

Dr. Palud, of the French Concession health department, again stressed the filthy condition of Siccawei creek which was a menace to both areas (Chinese and French), and said that the French Council was ready to cooperate with the proper authorities for the elimination of this sore spot.

The Chairman referred to the splendid new laboratory in the French Concession. He hoped Dr. Palud would permit Dr. Raynal, who had taken charge of the laboratory, to serve on one of the committees this year. Dr. Huang reported that 77 per cent of the people who were given one injection of anti-cholera vaccine came for a second, while only one-third of those who were given a mixed typhoid-cholera vaccine showed up again for a second injection. He thought this was due to the greater reaction caused by the mixed vaccine. Dr. Huang also referred to the Health Committee organized last year under distinguished patronage. This body had already done good work along the Shanghai-Hangchow-Ningpo Railway. A health station was established north of Chuang-chow last year.

Plans for 1936

Dr. Robertson drew attention to the efficacy of more concentrated vaccine. Work carried out by Drs. M. Y. Dzen and H. Yu showed

that while two doses of the ordinary strength (2000 millions of killed bacteria) had proved efficacious, one injection did not afford equal protection. He suggested a strength of 8000 millions, which would obviate the necessity of giving two injections—always a practical difficulty in a mass inoculation campaign. Dr. Blakelock said that as the campaign was to start on May 1, the question of raising the concentration of cholera vaccine had to be deferred to next year. Dr. Li mentioned that he proposed to begin mass inoculation on May 15 this year, while Dr. Palud for the French Concession reported that his department would start on April 15. Dr. Jordan thought a higher strength of vaccine would cause such a strong reaction that the public would be frightened away, thus defeating the object of the prophylactic measure. He preferred a slight protection to no protection at all. Dr. Robertson referred to the strength used in India and in the Royal Army Medical Corps, namely 8,000 millions.

The Chairman hoped that 1936 would be passed without the occurrence of an epidemic of cholera. He emphasized the importance of conducting an intensive propaganda campaign. Dr. Wu also remarked upon the fact that the poor in Shanghai were well served by the summer diseases hospitals.

Dr. Huang suggested that a pamphlet containing suggestions as to what to do, where inoculations were to be had, and the names of the hospitals equipped for treatment of cases, should be printed and sent to all practitioners in Shanghai. Dr. Wu proposed the following committee to draft the pamphlet; this was agreed to:—Drs. Li Ting-an, T. F. Huang, W. R. Johnston, Y. Palud and C. Y. Wu.

The Chairman reported that the following hospitals with a total accommodation of over 1,000 beds would be available this summer for the reception and treatment of cholera patients:—Thibet Road Chinese Infectious Diseases Hospital (200 beds); Shanghai Emergency Hospital (200 beds); S.M.C. Isolation Hospital (70 to 100 beds); Chinese City Isolation Hospital, Nantao (60 beds); Greater Shanghai Isolation Hospital, Chapei (120 to 200 beds); Hongkew Summer Diseases Hospital, Lin Ching Road (150 beds); Chinese Summer Diseases Hospital, Pingliang Road (150 beds) and French Isolation Hospital, Rue Massenet (80 beds).

Dr. Yen suggested that out-patient clinics might be opened in connection with existing hospitals, so that suspicious cases of summer diseases might be seen, especially early in the season. He thought that if the clinics were free, they would be well patronized.

Dr. Wu referred to the generosity of the various waterworks companies in supplying free piped water to the hut population. He hoped they would continue to do so this year. Dr. Li reported that Pootung now had its own waterworks which it was hoped would be able to cater to the quarter million inhabitants of this district in course of time. Dr. Huang mentioned that where the Railway had sunk artesian wells, pure water could be obtained free not only by employees but also by people living in the vicinity of the railway.

Election of Committees

The Chairman proposed the re-election of last year's members of both Epidemiological and Propaganda Committees, with the Chairmen having power to co-opt whenever necessary. This proposal was carried. The Committees are therefore constituted as follows:—Epidemiological Committee:—Drs. Wu Lien-teh (chairman), M. Y. Dzen, Blakelock, L. K. Ou, Palud, Y. N. Yang, F. C. Yen, T. F. Huang, R. C. Robertson, J. W. H. Chun. (Dr. Raynal co-opted). Propaganda Committee:—Drs. Li Ting-an (Chairman), H. Smith or W. R. Johnston, Rabaute or Palud, T. F. Huang and C. Y. Wu.

The meeting adjourned at 4 p.m. Dr. Li Ting-an, Commissioner of Public Health, Greater Shanghai, was host to the delegates at tea in the City Government cafeteria. The whole party then proceeded to inspect the new Hygienic Laboratory of the City Government, situated close to the Administration Building, Kiangwan.

B. COMMITTEE ON EPIDEMIOLOGY

First Meeting—May 15, 1936

Present:—Drs. Wu Lien-teh (Chairman); T. F. Huang; L. K. Ou; F. C. Yen; M. Y. Dzen; J. H. Blakelock; G. Raynal; R. Pollitzer; J. W. H. Chun (Secretary).

1. The minutes of the last meeting were read and approved.
2. The Chairman reported that from a lighter which left Hankow on May 9, a suspected case of cholera was put on shore for hospitalization in Kiukiang on May 10. On arrival of the lighter at Shanghai on May 12, the contacts were subjected to observation and inoculation and were found to be all healthy. Efforts were made to ascertain the fate of the patient and the true diagnosis.

Dr. Blakelock said he had examined one or two stools but had found no positive cases. Anti-cholera inoculation was started on May 1.

Dr. Raynal said no cholera has been found in stool examinations.

Dr. Dzen stated he will start stool examinations next month.

Dr. Huang said the Railway had established a new hospital in Hangchow where facilities for bacteriological diagnosis were available.

The Chairman said during the week ending May 9, 192 cases of cholera were reported in Calcutta, 8 in Bangkok and 13 in Chittagong, and asked if any improvement in the methods of getting people inoculated had been made.

Dr. Huang said anti-cholera inoculation was compulsory among the railway staff, but more families voluntarily came for inoculation this year than last.

3. The Chairman said he hoped the same facilities for the laboratory diagnosis of cholera would be extended to towns situated along the Yangtze valley and around Shanghai. Last year the Central Field Health Station examined suspicious stools sent from certain towns along the Yangtze river and the Lester Institute those from places nearer to Shanghai.

4. Sub-Committee on Serology. Drs. Robertson, Yang, Dzen, Pollitzer, Blakelock, Kuroya (co-opted) were appointed to serve as members.

Sub-Committee on Stool Examination. Dr. Dzen was elected as Chairman.

Sub-Committee on Clinical Investigation. Dr. Yen was appointed as Chairman.

Sub-Committee on Meteorology. Dr. Chun was appointed as Chairman.

5. The Chairman said that free water was being supplied to the poor in the three Municipalities as in former years. He added that in order to acquaint the medical students with problems of plague in California, the California University conducted a course of lectures on plague. He suggested that the Medical Schools in China might have a short course on cholera.

Dr. Huang said the practice of sprinkling dirty water on cut fruits by hawkers was dangerous. After some discussion, this was referred to the Propaganda Committee.

Dr. Yen said as soon as the hut-dwellers had moved into the model houses recently built by the Greater Shanghai Municipality, other poor people moved into the huts thus vacated.

Dr. Ou said the Mayor had ruled that the mud-huts must be abolished within a radius of 1 kilometre from model villages within

one month and unemployed hut-dwellers be sent home at the expense of the Municipality. There were altogether 3,000 model houses, each capable of housing a family of five persons. The Chinese Waterworks had extended water supply to Woosung, and Pootung would soon have its own Waterworks.

After some discussion, the Chairman said two members of the Quarantine Service would be sent to investigate the social conditions of the hut-dwellers along the Siccawei Creek.

Second Meeting—June 19, 1936

Present:—Drs. Wu Lien-teh (Chairman); L. K. Ou; J. H. Blakelock; J. Raynal; W. Kao; R. C. Robertson; R. Pollitzer; J. W. H. Chun.

1. Minutes of the previous meeting.—Dr. Ou pointed out that under section 5, paragraph 4, the qualification "within a radius of 1 kilometre from the model village" should be added in connection with the abolition of mud-huts. After this amendment, the minutes were formally approved.

2. The Chairman said Drs. T. F. Huang and M. Y. Dzen were unable to attend the meeting. He then gave the gist of Dr. Rabaute's letter in which he said that, owing to the apparent lack of co-operation on the part of the Greater Shanghai Municipality in the solving of the Siccawei Creek problem, he had to resign with regret from the Central Cholera Bureau.

Having personally investigated the creek condition, the Chairman wrote to Mayor Wu Te-chen to solicit his interest. The Mayor replied that the deplorable condition of the creek was partly due to the pouring of sewage from the French Concession and that the Greater Shanghai Municipality had contributed a large sum (\$47,500) towards deepening the creek in 1933. However, he would instruct the Bureau of Public Health to re-examine the problem and to report. The Chairman hoped that the P.W. and P.H. departments of the two Municipalities would get together for a series of meetings so as to solve the whole question in the near future.

Drs. Blakelock and Dzen (by letter) reported no cholera stools had come under their notice.

3. Diagnosis of cholera in out-ports.—It was decided that the Central Field Health Station should be requested to continue extending this facility to the cities along the Yangtze River.

Dr. Kao reported 6,162 railway employees and members of their families were inoculated against cholera and 1,885 against cholera and T.A.B.

4. Report of Sub-committee on Serology.—It was agreed that the scope of the sub-committee might be widened to embrace bacteriology and serology and that a study should be made on cholera antigen and bacteriophage. Dr. Raynal was co-opted. The general opinion on the question of living avirulent cholera vaccine appeared to be that it was difficult to standardize owing to the lack of susceptible animals.

Sub-committee on Meteorology.—Dr. Chun read a short report on the previous rainfall and annual cholera deaths and presented a preliminary graph on their relationship.

5. The Chairman said it had come to his notice that certain hospitals in Shanghai received both maternity cases and summer diseases and asked what steps could be taken to curb this dangerous practice. After some discussion, it was decided that the Health Departments of the Municipal authorities concerned should be approached.

Third Meeting—August 26, 1936

Present:—Drs. Wu Lien-teh (Chairman); T. F. Huang; M. Y. Dzen; F. C. Yen; R. Pollitzer; J. W. H. Chun.

1. Minutes of the previous meeting.—The minutes of the previous meeting having been sent to the members were taken as read and confirmed.

2. The Chairman said it was very satisfactory to note that up to date no cases of cholera had been reported from any part of China. He felt that there was justification for hoping there would be no cholera this year.

It was brought out by Drs. Yen and Huang that there were many cases of typhoid and dysentery in July and that in some respects these diseases were more important than cholera. Dr. Dzen said that during July he had examined 42 specimens from the Shanghai Hospital, Hongkew Hospital, Chinese Infectious Diseases Hospital, Shanghai Benevolent Hospital, Chow Poo Hospital and Pootung Hospital—all with negative results. Dr. Blakelock was unable to attend the meeting, but phoned to say that no cholera vibrios were discovered in stool examinations. With regard to the Chinese Summer Diseases Hospital in Ward Road which was alleged to have admitted both summer diseases and maternity cases, the S.M.C. Health Department found on investigation that they were housed in separate buildings and looked after by separate staffs.

3. Dr. Chun read a short report on the close correlation between the mean monthly absolute humidity and temperature based on the records of the past 11 years.

Dr. Pollitzer suggested that it might be profitable to study the incidence of cholera in China and compare it with that in India, Indo-China and Philippine Islands year by year.

4. The Chairman said that the total number of anti-cholera inoculations performed by the three Municipal Health Authorities and the Railway Health Service up to the end of July amounted to 529,110.

C. REPORT OF SUB-COMMITTEE ON METEOROLOGY

First Report—June 19, 1936

Last year the total number of annual cholera *deaths* in Shanghai from 1886 to 1934 were recorded in tabular and chart forms. This year it is proposed to treat the total number of annual cholera *cases* in Shanghai from 1930 to 1935 in a similar way. This is desirable because it is thought that the recording of the number of cases gives a better idea of the severity of an epidemic than the number of

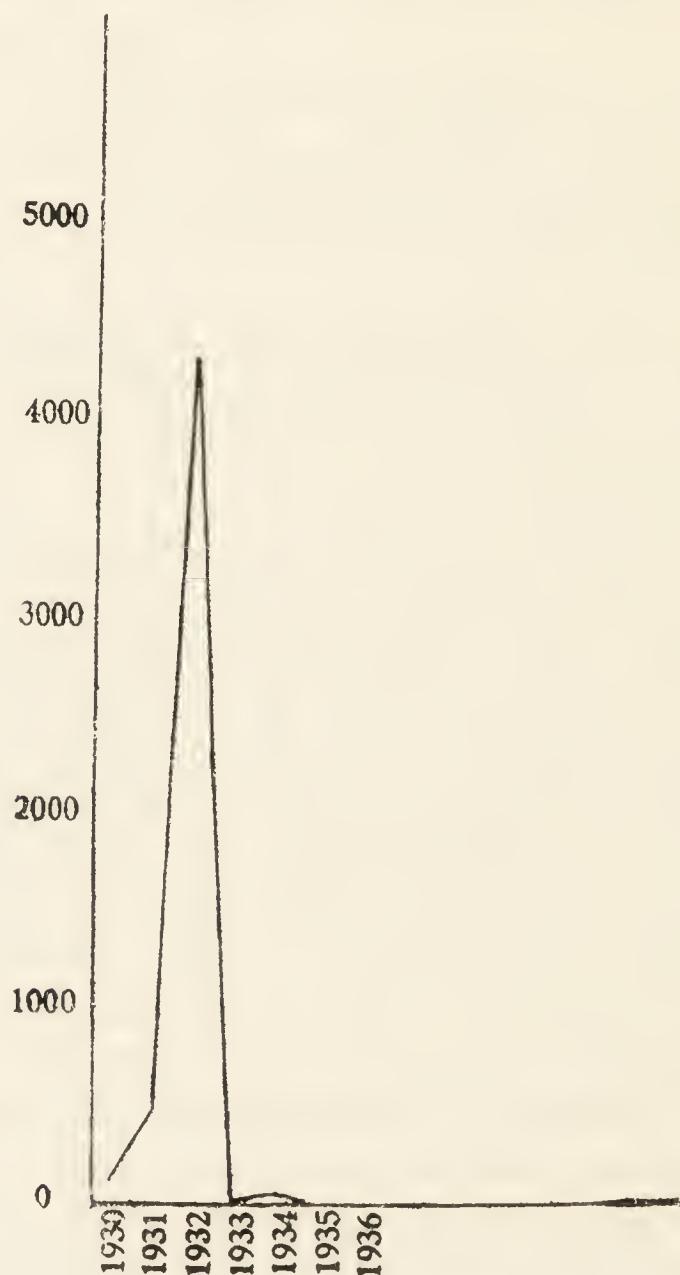


CHART I. Annual Cholera Cases in Shanghai.

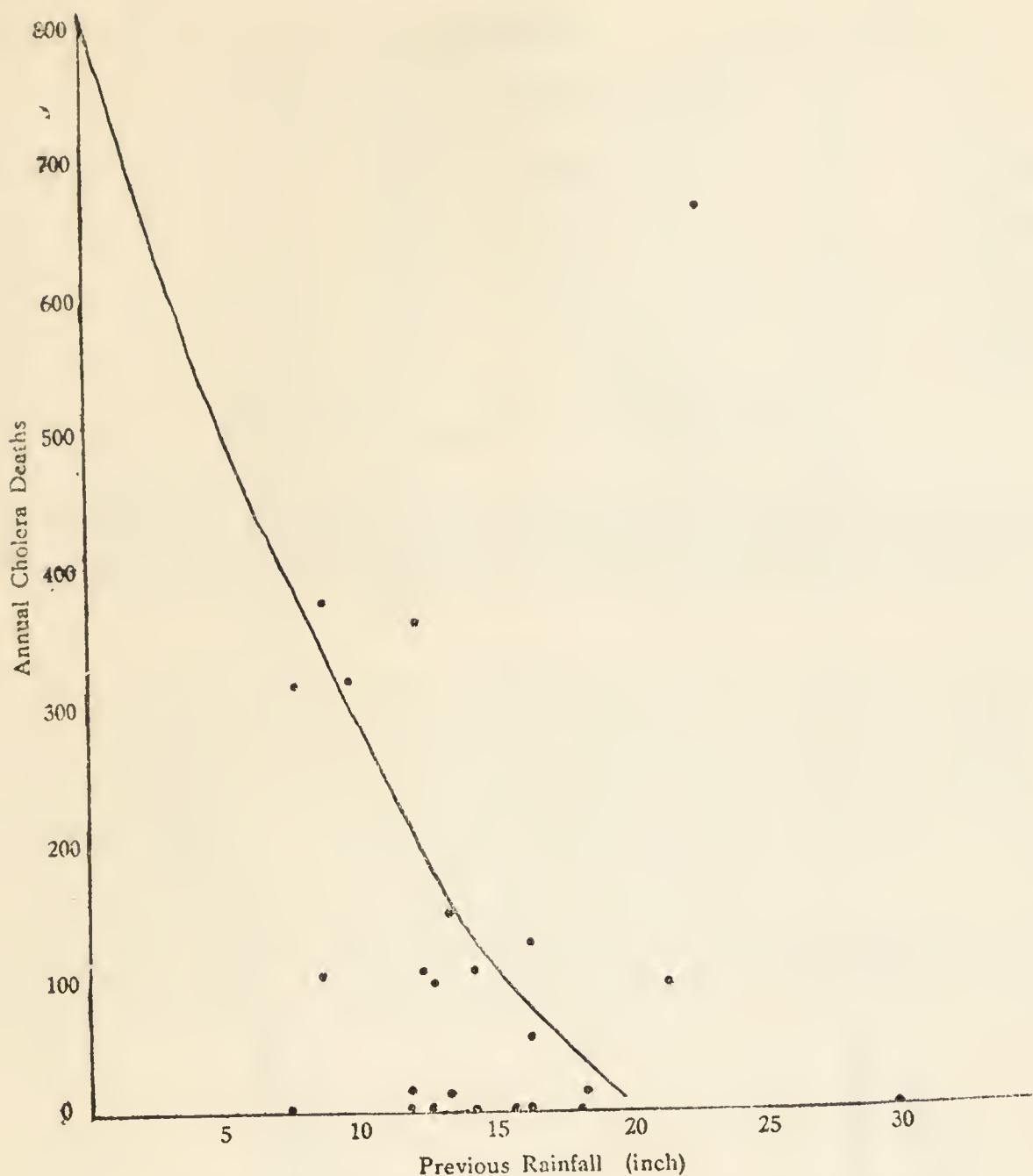


CHART II. Previous Rainfall and Annual Cholera Deaths.

deaths. Secondly, ever since the establishment of the Central Cholera Bureau in 1930, the diagnosis of cholera has been placed on a sounder basis, and as a result cholera statistics have become more accurate.

The table and chart show that cholera was not very prevalent in 1930 and 1931. 1932 was a severe cholera year. 1933 was clear, while there were only 3 cases in 1934 and none were recorded in 1935.

Continuing the gathering of data, and taking the period between November and April as in former years, the previous winter and spring rainfall for this year was 15.17 inches. Since the average rainfall for this period for the last 25 years is 14.02 inches, the previous rainfall for this year cannot be considered scanty.

A preliminary graph (Chart 2) showing the relation (if any) between previous rainfall and cholera is presented.

TABLE I

Annual Cholera Cases in Shanghai

Year	No. Cases	Year	No. Cases
1930	128	1933	—
1931	480	1934	3
1932	4,296	1935	—

Second Report—August 26, 1936

The mean monthly temperature and absolute humidity for 1934, 1935 and the first half of 1936 in Shanghai are recorded in tabular form:—

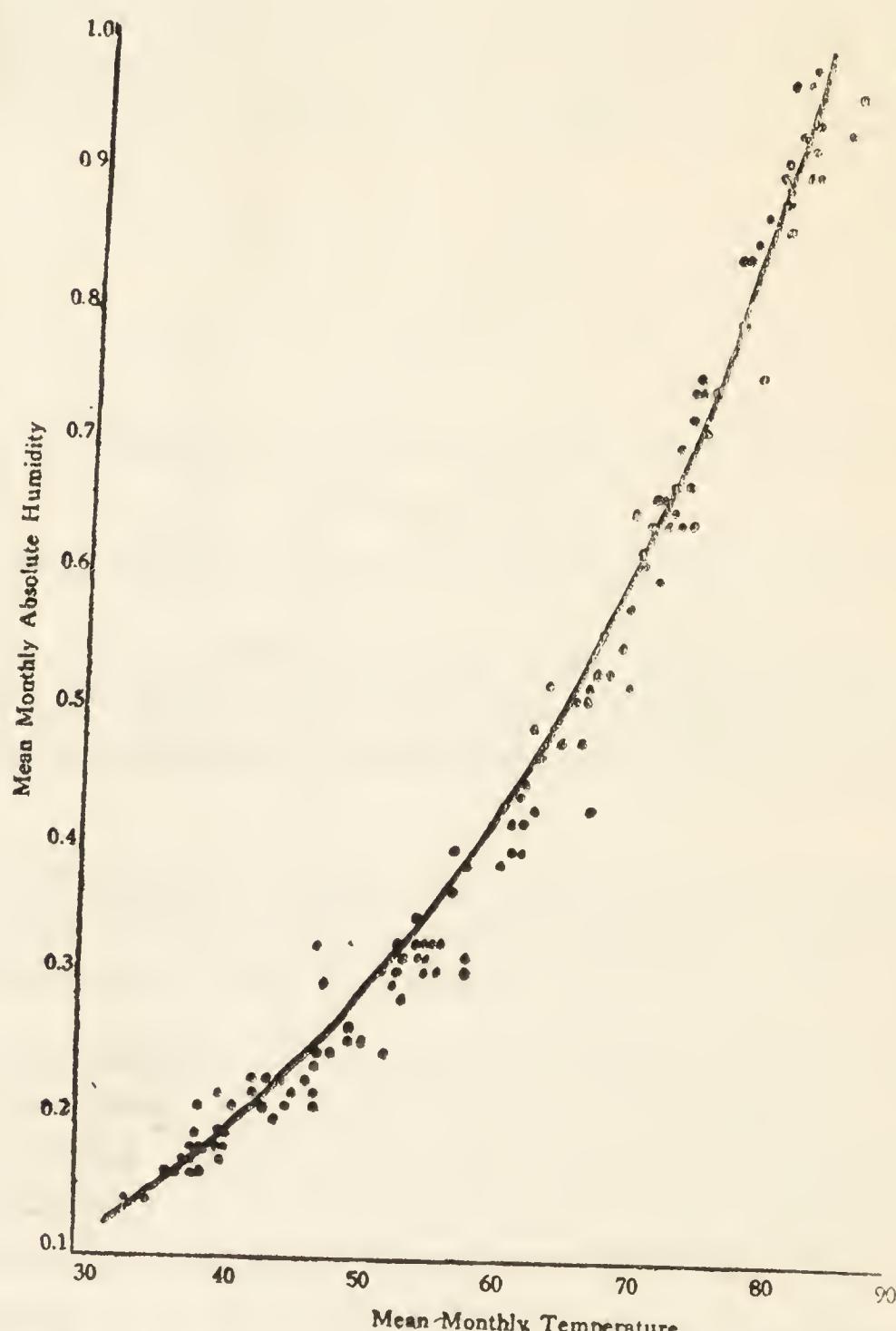


CHART III. Mean Monthly Temperature and Absolute Humidity (1925-1935)

	Temperature (Fahr.)			Absolute Humidity		
	1934	1935	1936	1934	1935	1936
January	35.3	40.8	36.2	0.14	0.19	0.16
February	40.6	43.9	39.3	0.18	0.23	0.18
March	47.6	53.1	42.8	0.21	0.30	0.20
April	54.9	58.4	59.0	0.33	0.39	0.39
May	68.3	70.3	64.7	0.53	0.52	0.51
June	74.9	76.0	77.0	0.64	0.71	0.82
July	87.4	83.5		0.96	0.97	
August	86.4	83.9		0.93	0.98	
September	76.3	73.7		0.74	0.65	
October	63.4	68.6		0.43	0.56	
November	52.8	57.7		0.31	0.40	
December	44.2	40.5		0.2	0.22	

As in former years, the temperature and absolute humidity tend to follow each other closely. Starting from the lowest point in January, they go up above 60°F and 0.4 inch, the critical points respectively, in May. The peak is reached either in July or August and by November they have gone down again.

The close correlation between the temperature and absolute humidity for the last 11 years (1925-1935) is illustrated in graphic form (Chart 3).

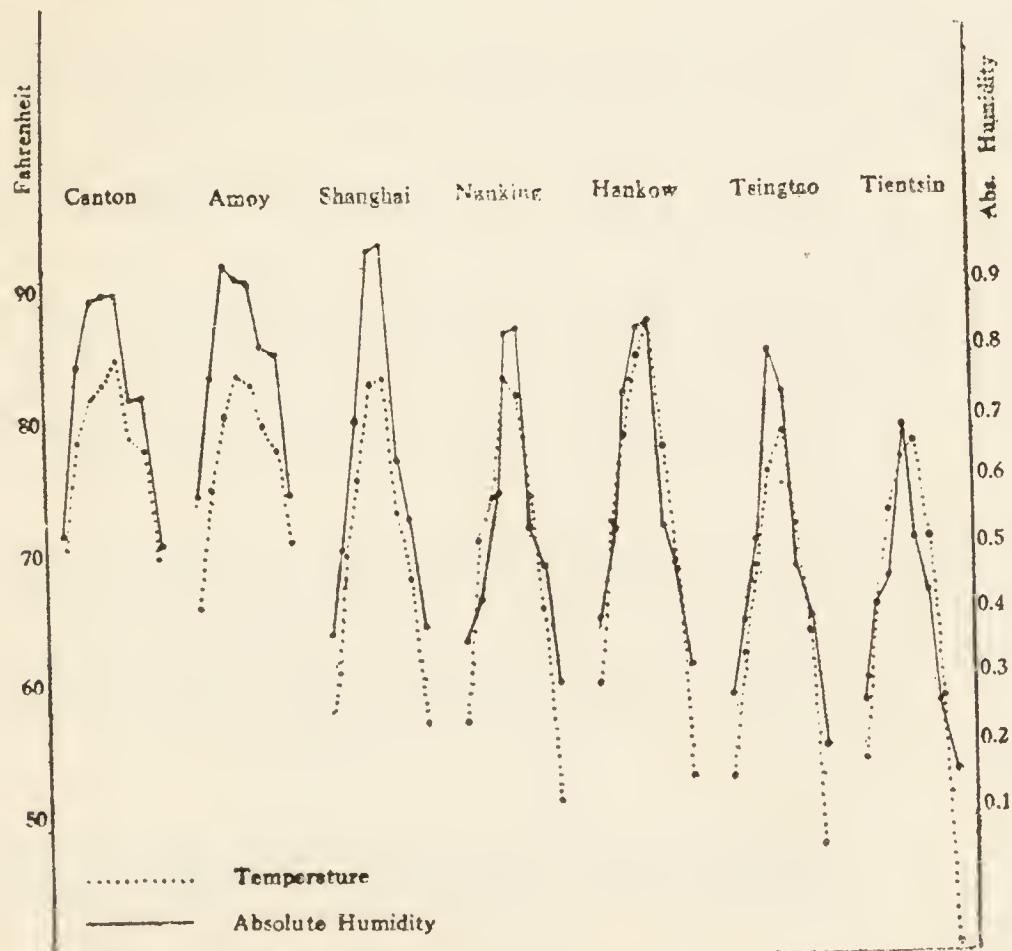


CHART IV. Monthly Mean Temperature and Absolute Humidity From April to Nov. 1935.

TABLE II.
Monthly Mean Temperature and Absolute Humidity for 7 Ports

	April			May			June			July			August			September			October		
	Temp.	Abs. Hum.	Temp.	Abs. Hum.	Temp.	Abs. Hum.	Temp.	Abs. Hum.	Temp.	Abs. Hum.											
Canton	1933	71.2	0.67	80.2	0.86	83.6	0.98	85.4	1.05	85.4	0.96	83.5	0.90	75.7	0.62	71.1	0.46				
	1934	66.5	0.56	78.0	0.82	81.0	0.88	83.0	0.93	81.0	0.78	82.0	0.82	73.0	0.60	60.0	0.38				
	1935	71.2	0.54	79.5	0.80	82.7	0.90	83.6	0.91	85.2	0.91	79.7	0.75	78.8	0.77	70.1	0.53				
Amoy	1933	69.6	0.57	81.8	0.86	80.2	0.91	85.4	0.88	84.6	0.86	80.5	0.67	77.2	0.52	70.6	0.45				
	1934	64.0	0.46	74.0	0.66	80.0	0.92	83.0	0.92	83.0	0.87	82.0	0.77	75.0	0.58	67.0	0.38				
	1935	66.5	0.60	75.5	0.78	81.3	0.95	84.3	0.93	83.8	0.92	80.6	0.83	78.9	0.82	71.7	0.60				
Shanghai	1933	54.8	0.32	69.8	0.55	74.8	0.74	83.7	0.94	83.7	0.90	75.6	0.75	62.3	0.42	54.3	0.32				
	1934	54.9	0.33	68.3	0.53	74.9	0.64	87.4	0.96	86.4	0.93	76.3	0.74	63.4	0.43	52.8	0.31				
	1935	58.4	0.39	70.3	0.52	76.0	0.71	83.5	0.97	83.9	0.98	73.7	0.65	68.6	0.56	57.7	0.40				
Nanking	1933	57.2	0.34	67.9	0.51	74.4	0.71	83.6	0.89	83.3	0.82	74.8	0.65	61.1	0.40	52.5	0.27				
	1934	54.5	0.31	70.8	0.51	78.6	0.71	87.9	0.92	84.9	0.83	73.2	0.64	60.0	0.38	49.8	0.24				
	1935	57.9	0.37	71.2	0.44	74.8	0.60	83.8	0.84	82.5	0.85	74.8	0.56	66.3	0.49	51.9	0.32				
Hankow	1933	61.3	0.42	73.4	0.58	78.0	0.74	87.1	1.02	86.7	0.95	77.5	0.72	62.0	0.42	54.8	0.31				
	1934	56.0	0.32	74.0	0.54	80.0	0.69	89.0	0.83	85.0	0.75	74.0	0.57	60.0	0.35	52.0	0.25				
	1935	60.6	0.41	72.8	0.55	79.5	0.75	85.1	0.84	87.6	0.85	78.2	0.54	69.0	0.48	53.2	0.34				
Tsingtao	1933	49.8	0.24	60.8	0.38	67.2	0.57	77.7	0.80	77.0	0.75	71.2	0.54	59.9	0.32	47.6	0.20				
	1934	48.3	0.22	62.4	0.41	68.5	0.54	77.1	0.82	77.7	0.82	70.7	0.56	62.6	0.28	48.5	0.19				
	1935	53.4	0.29	62.6	0.40	69.5	0.53	76.6	0.82	79.7	0.76	72.5	0.48	64.2	0.41	48.3	0.23				
Tientsin	1933	62.6	0.43	66.5	0.47	76.1	0.71	88.7	1.15	72.5	0.67	71.6	0.61	59.9	0.36	45.8	0.21				
	1934	51.0	0.22	68.0	0.28	74.0	0.54	82.0	0.82	75.0	0.64	69.0	0.54	54.0	0.32	41.0	0.18				
	1935	54.8	0.27	66.3	0.43	73.4	0.47	77.5	0.70	78.9	0.53	71.5	0.44	59.5	0.29	40.3	0.17				

D. ANTI-CHOLERA INOCULATION FIGURES, SHANGHAI

	Greater Shanghai	International Settlement	French Concession	Railway Health Service	Total
1930	404,675	66,338	66,021	—	537,034
1931	534,466	162,939	63,874	—	761,279
1932	668,403	173,655	64,654	—	906,712
1933	545,465	242,069	77,879	—	865,413
1934	448,551	211,915	80,472	8,687	749,625
1935	474,030	203,254	81,720	8,721	767,725
1936	427,247	192,043	121,440	14,095	754,825

E. BULLETINS

(Issued by Dr. Wu Lien-teh, Chairman)

1. The beginning of June seems to be an appropriate time for

No. 1—June 3, 1936

issuing the first Bulletin of this Bureau, especially as this is a "critical year" so far as cholera is concerned.

2. A study of epidemics during the past years shows a tendency for periodical outbreaks of a severe nature every three or four years, the last one occurring in 1932, followed by three years of practical calm. It has been the duty of the Epidemiological Committee of the Central Cholera Bureau, consisting of experts attached to the Public Health departments and institutions in Shanghai and Nanking to ascertain as far as possible the causes of such outbreaks and to find remedies for same.

3. For this purpose a study of meteorological factors has been undertaken. The current year 1936 appears to the average person to have been marked by excessive rainfall, but an analysis of records shows this is not really so as proved by the following table:—

	No. of rainy days	Inches rainfall	Total cholera cases
January 1 to May 31, 1931.....	67	19.42	480 (1931)
„ „ 1932.....	50	12.47	4,296 (1932)
„ „ 1933.....	68	20.90	— (1933)
„ „ 1934.....	52	14.30	3 (1934)
„ „ 1935.....	50	10.27	— (1935)
„ „ 1936.....	54	13.37	
Average same period (65 years)		14.87	

The average for the past 65 years (Jan. to May) is 14.87 inches of rainfall in Shanghai. Therefore it may be said that the rainfall

from Jan. to May in 1936 is below the average and that both in the number of rainy days and inches of rainfall the year 1936 is definitely lower than 1931 or 1933.

4. According to authorities like Sir Leonard Rogers (formerly of India), a previous scanty rainfall is favourable for cholera epidemics. This is partly demonstrated in 1932 when the rainfall registered 12.47 inches and there was an excessive number of cases. On the other hand, it should be added that though the year 1935 recorded only 10.27 inches of rainfall there was not a single case of cholera. Hence it would be idle to prognosticate as to the possibilities of an epidemic this year, though every precaution should be taken by the public to protect themselves in addition to the preventive measures that have been undertaken by the health authorities.

5. Cholera is largely a water-borne disease, though this does not mean that only actual drinking water causes it. Contaminated hands, dirty utensils, infected raw vegetables, fruit, cold drinks and flies may also cause the disease. It is most important, therefore, that uncooked food and unsafe drinks should be avoided as far as possible. The hands should be washed before partaking of or handling meals at table. Much can be done in this direction by heads of households and employers of labour in the education of their servants and employees.

6. The poorer classes are the greatest sufferers of cholera during any epidemic. To help them the different municipalities and water companies of Shanghai have introduced a system of free water-supply. There are at present 30 free hydrants in the International Settlement open for limited hours during the day and 91 hydrants in the French Concession to which the poor may have access at all times. In Greater Shanghai over 50 hydrants are available for similar purposes, so that there should be no excuse for the people, however poor, to use polluted water for drinking. With the establishment of the new waterworks at Pootung the poor in that region will also be protected. At the same time, it should be acknowledged that some of the poor may not have access to pipe water on account of their living too far away or being at work when the hydrants are open. To safeguard water from other sources such as wells, ponds, etc. the health authorities have commenced their disinfection with chlorinated lime, and it is hoped that this additional precaution may lessen the incidence of cholera if and when it does appear.

7. Anti-cholera vaccination was commenced by the French Concession on April 15, the International Settlement on May 1, and

Greater Shanghai on May 15. In this connection it may be interesting to record the steady increase in popularity of this method of protection since 1930 as shown by the following table:—

	Anti-cholera Inoculation Figures					
	1930	1931	1932	1933	1934	1935
Greater Shanghai	404,675	534,466	668,403	545,465	448,551	505,125
International Settlement	66,338	162,939	173,655	242,069	211,915	203,254
French Concession	66,021	63,874	64,654	77,879	80,472	81,720
Railway Health Service	—	—	—	—	8,687	8,721
	—	—	—	—	—	—
	537,034	761,279	906,712	865,413	749,625	798,820
	—	—	—	—	—	—

It is hoped that the figures for 1936 will be even higher and that the inhabitants of this great metropolis may submit to the simple ordeal each year whether any epidemic occurs or not. Travelling vaccination vans and branch health offices are stationed in different parts of the city in order to bring anti-cholera inoculation within the reach of all classes of people. No charge whatever is made by the health authorities.

8. Educational propaganda in streets, schools, factories and other institutions has accomplished much in the way of acquainting the masses with the need of protecting themselves against cholera. The intelligent public could also help in this matter.

9. There is a total accommodation of over 1,000 beds, in some eight hospitals in Shanghai, available this summer for the reception and treatment of cholera patients. Their localities and the number of beds are indicated as follows:

Thibet Road Chinese Infectious Diseases Hospital	200 beds
Shanghai Emergency Hospital	200 "
S.M.C. Isolation Hospital	70 to 100 "
Chinese City Isolation Hospital, Nantao	60 "
Greater Shanghai Isolation Hospital, Chapei	120 to 200 "
Hongkew Summer Diseases Hospital, Lin Ching Road	150 "
Chinese Summer Diseases Hospital, Pingliang Road	150 "
French Isolation Hospital, Rue Massenet	80 "

In order to save life or obtain the maximum benefit when an attack of cholera appears the patient should be rushed to the proper hospital and be treated at once. A difference of half an hour or so may mean life and death to the sufferer.

No. 2—July 13, 1936

1. Since the issue of the last bulletin on June 3, health authorities have been watching carefully for any sign of cholera or infection simulating cholera. Every case of gastro-enteritis has been investigated, the stools have been examined bacteriologically

and suspicious areas marked. Fortunately although this is the middle of July, no sign of the dread disease has so far been detected. If this present state continues till the end of the month, we may look forward to the remaining days of the summer with greater confidence.

2. Only two important cities in Asia have reported outbreaks of cholera on a considerable scale, namely, *Calcutta*, whose weekly figures rose from 15 on Jan. 4 to 268 on May 16, and have since fallen to 52 on July 4; and *Bangkok* which recorded 15 cases weekly on Jan. 4, 60 on Feb. 29, decreasing gradually to 6 on July 4. So on the whole this year's cholera incidence in the danger areas may be considered quite low.

3. After a prolonged cold and damp spring the summer commenced with a heat wave of 95.2°F on July 1, varying in intensity during the succeeding days until July 9 when 96.6 was reached and July 11 with a record of 97.2. The relative humidity varied from 88 on July 1 to 100 on July 4 and 5. Last year's figures showed a maximum temperature of 100.8°F on July 14 with maximum humidity of 98 on July 1 and 12.

4. Although, for the prevention of cholera, stress has been laid upon the need of a pure water supply, prophylactic inoculation, control of food supplies, elimination of flies, and personal hygiene, the importance of the housing problem should not be forgotten. For unless the poor are afforded hygienic facilities and are able to live and work amidst sanitary surroundings, they will not be "health-conscious," since they will be obliged to still use polluted creeks for the washing of their rice, vegetables and utensils.

To ameliorate such conditions, the Mayor of Greater Shanghai has during the past three years constructed four model villages with ample open spaces for recreation in different parts of the city, the houses of which are rented to working families at the small figure of \$3-\$4 per month. These villages are situated at a) Chung Shan Road, with 330 dwellings; (b) Pu-shan Road, 250; (c) Chi Mei Road, 252; (d) Ta Mu Ch'iao Road, 158: Total 990 houses. Roughly speaking, as each house can accommodate at least 5 persons, provision for 5,000 people has thus been made. Compared to the size of Shanghai, this is a small beginning, and it is hoped that this system may be adopted by other municipalities as a forward step in the improvement of general health conditions.

5. Anti-cholera vaccination has been persisted in by all three municipalities of Shanghai. The following figures show the progress up to the end of June. For purposes of comparison, the 1935 figures are also appended.

	1936	1935
Greater Shanghai	200,000 approx. (May-June)	210,909 (May-June)
S.M.C.	82,413 (May-June)	84,883 (May-June)
French Concession	66,039 (May to July 10)	44,890 (April 16-June)
Railway Health Service	8,242 (up to May 31)	5,594 (April-May)
	<hr/>	<hr/>
	356,694	346,276
	<hr/>	<hr/>

No. 3—September 22, 1936

1. Two and half months have passed since the publication of the last Bulletin (July 13). During this period although a close watch has been made over every case of gastro-enteritis admitted into hospital, not one of authentic cholera has been diagnosed either in Shanghai or any other port of China. The disease is not likely to appear this year.

2. 1936 may therefore be called the fourth consecutive cholera-free year (with the exception of a few sporadic cases in 1934), although for some time past it has been considered by many health authorities as a critical one. Several reasons have been given for this happy state of affairs, and among them may be mentioned greater health-consciousness among the masses, more extensive pure water-supply, more successful propaganda and public health measures by municipal and other organizations, diminished incidence of cholera in neighbouring endemic centres and continued intensive anti-cholera vaccination.

3. It may be that all the above points have contributed more or less to the result, but two facts appear clearly:

- a) The importance of co-operation and tempered publicity in health matters.
- b) The need of disregarding the common view that Shanghai is an endemic centre of cholera.

4. Apart from the value of prophylactic inoculation, laboratory investigations have tended to prove the negligible part played by human carriers in the origin and spread of cholera. This is in direct contradiction to another serious bowel disease, namely typhoid, where the healthy carrier is a most dangerous person and should be protected against.

5. The past two summers, 1935-6 have been characterized by fairly high temperature (Max. 100.8°F) with very high humidity in contrast to the summer of 1934 when the temperature reached a record of 104.4°F (Max.) with a comparatively low humidity. Although the meteorological data appeared favourable for cholera

in 1936 as judged by Indian experience, we have been fortunate in China in being entirely free from the infection.

6. However, if cholera has been absent in Shanghai and other coastal cities, there has been a marked prevalence of other bowel diseases like dysentery and typhoid. The latter has been particularly severe. In Shanghai, Swatow, Amoy and Canton, recently visited by me, the death rate has been considerable. The 1935-1936 figures for Shanghai, particularly high in July and August, are as follows:

		Enteric Fever		Dysentery	
		Cases	Deaths	Cases	Deaths
1935	January-August	424	303	406	75
1936	January-August	664	346	449	78

The value of anti-typhoid inoculation is abundantly proved by the comparative absence of the disease among Chinese troops who receive compulsory vaccination.

7. Anti-cholera inoculation figures kindly supplied by the health authorities are as follows:—

Anti-cholera Inoculation Figures

	Greater Shanghai	International Settlement	French Concession	Railway Health Service	Grand Total
May	77,608	34,627	21,177	8,242	141,654
June	136,546	47,786	35,763	4,204	224,299
July	88,368	45,636	27,832	1,321	163,157
August	86,071	37,956	23,669	328	148,024
	388,593	166,005	108,441	14,095	677,134

Last year's total inoculation figures..... 767,725

8. This is the last bulletin of the year. The Central Cholera Bureau may be congratulated upon the generous cooperation and support of its constituent members, including the Municipal and other health departments and institutions, without which its work would not have been possible. In view of the success which has so far attended the campaign against cholera, it might be advisable to expand the work of the Bureau so as to include other bowel diseases like typhoid, dysentery, various forms of gastro-enteritis, etc. The causes and methods of prevention of these infections run along more or less similar lines. I feel that what has been accomplished in the case of cholera could also be duplicated in other bowel complaints. I propose later in the year to submit a plan for the establishment of a Joint Summer Diseases Bureau to replace the present Central Cholera Bureau for co-ordinating the several activities, here and elsewhere. A healthy Shanghai is as much an asset to China and the world as a wealthy and model settlement.

CO-OPERATION, IN HEALTH MATTERS, BETWEEN THE NATIONAL GOVERNMENT OF THE REPUBLIC OF CHINA AND THE LEAGUE OF NATIONS

Extract from Foreword by the Health Section of the League of Nations (Quarterly Bulletin of the Health Organisation of the League of Nations, Geneva, Vol. V, No. 4, December 1936)

REORGANISATION OF THE QUARANTINE SERVICES AT CHINESE PORTS

There are in a number of ports in China foreign concessions administered by the representatives of the foreign Powers concerned. Maritime quarantine work in China originated in these ports. Later on, the work had been taken over by the Chinese Maritime Customs and placed, as a rule, under the harbour-master, who was assisted by one or more foreign and Chinese medical officers. There was a foreign Customs commissioner in each port, who was in many instances responsible for drawing up or approving the quarantine regulations, and these varied from port to port. The quarantine services at Canton and Swatow were the only ones wholly in the hands of the Chinese authorities.

In view of the large share in the control of quarantine which devolved upon foreign officials—although these were really in Chinese employ—foreign shipowners looked upon these services as non-Chinese and were loath to see them transferred by the Government of China to the Ministry of Health. In order to avoid all difficulties, the Government of China asked the League to give it the benefit of the experience and assistance of the health services of other countries.

The following steps were taken by the Health Organisation to meet this request:

1. During the summer of 1930, members of the Health Section assisted the Chinese medical officers in making a thorough survey of all the important Chinese ports.
2. The Health Committee set up a mixed commission comprising Chinese medical officers, representatives of the Office international d'Hygiène publique, and of the health services of all the important maritime Powers, and—as the Chinese Government had requested—

experts appointed by the Communications and Transit Organisation of the League. This commission discussed and approved a scheme for the organisation of a new National Quarantine Service (May 1931). The experts delegated by the Communications and Transit Organisation expressed the views of the International Chamber of Shipping, and this dispelled any suspicion that the new National Quarantine Service would interfere unduly with the legitimate interests of shipping. In fact, the creation of the new service was sponsored by the chief maritime countries. That these steps were effective is shown by the rapid and uneventful progress of the National Quarantine Service. Organised at Shanghai in 1930, it has since been extended successively to all the principal ports. Its staff now consists of twenty-four chief medical officers, seven of whom received their training abroad under League auspices, and ten specialists who engage in research and have organised an infectious disease intelligence system for the benefit of the other Chinese ports and the provincial and municipal health authorities. Shanghai, where the headquarters of the service are situated, has seven quarantine inspectors.

CAMPAIGN AGAINST CHOLERA IN SHANGHAI

The metropolis of Shanghai is made up of an International Settlement, a French Concession, and a Chinese city which surrounds the other two municipalities. The combined population aggregates nearly three millions, and the Chinese city takes in a wide expanse of territory, some of which is very sparsely settled. There is a separate health authority in each municipality.

The occurrence of summer recrudescences of cholera in this urban area, particularly since 1919, caused serious anxiety. The Nanking authorities accordingly decided to launch a vigorous campaign against this state of affairs, and to ask the health services of the three municipalities to take part. They also sought the assistance of the Eastern Bureau of the Health Organisation in making an epidemiological study and in the co-ordination of preventive measures (1929).

The chief statistician of the Health Section, who was then at the Eastern Bureau, shortly afterwards proceeded to Shanghai to take part in the epidemiological studies.

At the same time, the directors of the health services of the three municipalities, having been called together by the Chinese Minister of Health, discussed the situation in consultation with the Director of the Eastern Bureau, and decided on the initiation of a joint campaign under centralised control. The campaign was begun immediately, the principal measures consisting of vaccination, protec-

tion of water-supplies and foods, provision of hospital beds, and creation of a "Cholera Bureau" to co-ordinate preventive measures, detect cases of the disease and organise propaganda in favour of vaccination.

Between 1930 and 1934, over four million inoculations against cholera were carried out with vaccines prepared in the Shanghai municipal laboratories. Although there is no intention of ascribing the results obtained solely to the effects of vaccination, it is a fact that there has not been a single proved case of cholera at Shanghai since 1932, whereas from 1919 to 1932 this disease never disappeared for more than twelve months at a time.



APPENDIX TO DR. F. S. WONG'S ARTICLE ON "THE MOVEMENTS
OF PEOPLES WITH SPECIAL REFERENCE TO
CHINESE EMIGRATION"

(*The following figures have been kindly supplied by the Hon. Mr. A. B. Jordan, Secretary for Chinese Affairs, Straits Settlements, to whom the author is greatly indebted*).

Return of Chinese Immigrants arriving at Singapore

1916	183,399	1920	126,077
1917	155,167	1921	191,043
1918	58,421	1922	132,886
1919	70,912		

Malaya Migration Statistics

(Arrivals of Passengers from China)

1923	157,710	1930	232,002
1924	177,639	1931	83,474
1925	209,946	1932	38,948
1926	335,964	1933	32,243
1927	346,984	1934	113,513
1928	286,613	1935	150,879
1929	289,237	1936	154,709

Proportion of Chinese to the total population in Malaya

Year	Total Population	Chinese Population	Proportion
1921	3,358,054	1,174,777	34.98%
1931	4,385,346	1,709,392	38.98%
1934	4,413,832	1,648,815	37.36%
1935	4,611,450	1,772,128	38.43%
1936	4,780,790	1,887,874	39.49%

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